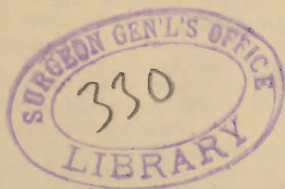


MACKENZIE. (J. N.)

Larynx - Catarrhal affections
of the . etc —————





forty; male. (Writer's case.)

FIG. IX.—Spindle-celled sarcoma of left ventricular band and ary-

tenoid. (After Poyet.)

FIG. X.—Round-celled sarcoma, sixteenth month, destroying epiglottis

and the adjacent tissues.

FIG. XI.—Encephaloid carcinoma, involving posterior laryngeal wall,

left arytenoid, ary-epiglottic fold, and cesophageal entrance.

FIG. XII.—Myxo-sarcoma, originating from the anterior commissure of

the vocal bands, causing great dysphonia and orthopnea.

LARYNX, CATARRHAL AFFECTIONS OF THE.
GENERAL OBSERVATIONS ON THE ORIGIN AND ETIOLOGY
OF THE SIMPLE INFLAMMATORY AFFECTIONS OF THE
UPPER AIR-PASSAGES.—In view of all that has been said
and written concerning inflammatory conditions of the
naso-laryngeal tract, it is amazing to find what little ad-

vance has been made toward a more rational conception of the causes that underlie diseases of such prevalence and wide distribution.

It is not the purpose of the present article to treat in an exhaustive manner the conditions under which inflammation of the upper air-passages develops, but simply to offer a few general observations as an introduction and guide to the rational study and treatment of the affection.*

At the outset of our inquiry we should divest the mind of the idea that the pathology of nasal and laryngeal disease is an isolated pathology. The eruption of catarrhal processes in the respiratory tract is governed by the immutable laws that condition the development and course of inflammation in general, and the rational interpretation of nasal and laryngeal affections presupposes, therefore, the application of general pathological principles to the peculiar conditions which the anatomical and physiological functions of the structures involve. Above all, we should remember that peculiarity of structure is not anatomical isolation; we should remember the correlation of organ and organ, the sympathy of tissue and tissue which make up the perfect physiological life of man. In looking upon the subject from the high vantage ground of general pathology and laws of health, we may, therefore, more readily apprehend the rôle which external and internal influences play in the evolution of nasal and laryngeal disease than if we viewed the same from the level of a narrow specialism or from the standpoint of the mere empiric.

I. Inflammation of the upper respiratory tract, either in its entirety or localized in its individual parts, is a disease of the human race which has existed from the remotest period of historic time.

II. The evolution of nasal, pharyngeal, and laryngeal inflammation in a given locality is, in all probability, a part of its geological history, and goes on *pari passu* with its varying meteorological conditions. Hence the geographical limits of the disease have varied with the different epochs of the earth's formation.

The elaboration of the above propositions involves an inquiry into the origin, the predisposing and exciting causes of nasal, naso-pharyngeal, and laryngeal inflammatory affections, and their distribution over the surface of the earth.

Origin.—In the third book of Plato's "Republic" the philosopher tells us that the names of catarrhs were unknown to Homer, and only came into use in the age of Socrates. This assertion of the Grecian sage has been made the groundwork of the thesis that catarrhal diseases are the products of civilized life, and furnishes, among other things, the basis of the Schneiderian argument, that they are born of luxury and ease and of the general degeneracy of mankind.

It is doubtless true that a marked tendency to catarrhal diseases belongs to modern man from the accidents which pertain to his environment, and that as civilization awakens morbid conditions unknown or rarely met with in the savage state, so the disposition to inflammatory troubles of the upper respiratory passages may be encouraged by transmitted vices and the enervating surroundings of modern social life. At the same time it is reasonable to assume that, as the chief causes productive of acute and chronic inflammation of the naso-laryngeal tract have been in operation from the remotest times, the origin of the affection is therefore traceable to the time of the origin of man himself.

The very etymological derivation of the word *coryza* carries us back through the dialects of the Hebrews, Arabians, Chaldeans, and Assyrians to the time when history emerges from fable; the attention paid by the most ancient exponents of medical art, of which we have any record, to inflammatory states of the nose and throat, implies the former frequency of these affections, while the derivation of the terms *angina* and *cynanche*, and the early origin of bronchotomy, point to their recognition

of the most dangerous forms of laryngeal disease. The classification and correct clinical history of disease is, moreover, a process of gradual evolution, and, in view of the confusion which reigned among the latter-day nosologists in regard to laryngeal affections, it is not surprising that in the most ancient records of medicine we fail to find that exact anatomical division of catarrhal affections which was the natural outcome of subsequent more advanced anatomical and physiological investigation.*

The remote origin of catarrhal affections is reflected not only in the most ancient records of medical art, but also in the classical writings of the earlier poets, philosophers, and historians.

Chronic affections of the nose and throat were looked upon by the popular satirists as indicative of dissolute habits—as the marks of intemperance and general moral obliquity. Thus Juvenal ridicules the quail-pipe voice forced beyond its natural compass, the foul snout of the debauchee, and draws the following graphic picture of the last stages of the libertine's career:

"Una senum facies, cum voce tremantia membra;
Et jam leve caput madidique infantia nasi."†

The senseless Phyllis of Perseus,¹ the laughing sot,²

"Gutture sulfureos lente exhalante mephites,"

typify, too, the injurious effects of luxurious habits, high living, and excesses in general upon the nasal passages and throat.

The pernicious influence of alcoholic beverages upon the throat seems also to have attracted popular attention, the Romans applying the term *angina vinaria* to the suffocative catarrh caused by the ingestion of large quantities of wine.³

The possession of a nasal polypus appears to have been regarded with especial aversion. Thus Martial exclaims that he honors a man with a comely nose, but desires to have nothing to do with the possessor of a polypus:

"Nasutum volo, nolo polyposum."‡

It is therefore not unnatural that the lords and ladies of those days should have resorted to many devices for the purpose of concealing their misfortune; but as the more certain modes of disinfection were then unknown, we are not surprised when Horace, in satirizing the deception, informs us that he can detect a polypus or fetid smell, however well concealed.

"Polypus an gravis hirsutis cubet hircus in alis,
Quam canis acer, ubi latet sus."‡

The frequent reference to snoring as a badge of dissolute habits may possibly indicate the frequency of some form of nasal obstruction, which we may, without much violence to logic, assume to be the expression of the hypertrophic form of rhinitis. This was, possibly, for example, the condition of Cicero's neighbor, Marcellus, and that of the Sodomite so frequently alluded to by the satirists, and described more technically by Reiskes.§

In the creature painted by Terence,|| on the other hand,

* Hence we find in the Ayur-Vêda, affections of the larynx confounded with those of the palate and pharynx, and among certain of the Hippocratic and Galenic schools the names larynx and pharynx are occasionally employed as convertible terms.

† Sat. x., 197, 198. Farther on (v. 199 et seq.), he describes the effect on the organ of hearing:

"Aspice partis
Nunc damnum alterius; nam quæ cantante voluptas,
Sit licet eximius citharædus, sive Seleucus
Et quibus aurata mos est fulgere lacerna?
Quid refert, magni sedent quæ parte theatri,
Qui vix cornicines exaudiet atque
Concentus? Clamore opus est tubarum ut sentiat
Quem dicat venisse puer auris quot nunciat horas."

‡ Martial, xii., 37. The term "polyposus" signifies here having a polypus, but it was also used by the ancients to designate those who were affected with ozæna, or stinking smell from the nostrils; while the appellation "ozænosus" was employed, on the other hand, to denote the presence of a polypus. This would seem to indicate a popular confusion of the two affections and their use as convertible terms.

§ "In naribus et in palato vitium, a quo clare non potuerint eloqui, sed pœyeu, stertere et rhonchissare debuerint," quoted by Gruner, *Morborum antiquitates*, Vratislav., 1774, sect. 1-4, p. 77, from Reiskes, *Observat. miscellan.*, Leid., 1746, def. p. 28.

|| "Fatuus et insulsus, bardus, sterit noctes et dies,
Neque istum metuas ne amet mulier."

Eunuch, Act V., Sc. 8, v. 49 and 50.

* The views contained in this article were first presented in a paper read by the writer at the American Laryngological Association, June 24, 1885. (See N. Y. Med. Journal, September 12 and 19, 1885.)



who snored both night and day, and whom no woman loved, the obstruction to respiration may have been seated lower down in the respiratory tract.

The stinking breath, hoarse voice, and snoring respiration of the cunnilingus, fellator and fellatrix, the effeminate, piping tone of the cinædus and irrumator, which excited the special scorn of the early satirical writers, were doubtless the expression of a catarrhal pharyngolaryngitis acquired in the discharge of their filthy practices.

The influence exerted upon the mental faculties and general health and the incapacity for vigorous intellectual endeavor wrought by catarrhal affections seem also to have been fully recognized by the ancients. The Greeks, for example, had a verb, *κορυζᾶω*, which signified to be dull or stupid. Cicero alludes to the heavy feeling or depression following catarrh,⁵ and Horace exclaims that the philosopher is the king of kings until his catarrh begins to trouble him:

"Sapiens uno minor est lore, dives
Liber, honoratus, pulcher, rex denique regum,
Præcipue sanus, nisi cum pituita molesta est."⁶

Etiology.—Catarrhal affections of the upper respiratory tract are met with at all periods of life. They may be ushered in during fetal life or accompany the degenerative processes of old age. While the loss of elasticity of the mucous membrane at the latter period and its consequent increased vulnerability, and its delicacy and imperfect development in infancy favor, other things being equal, the development of inflammatory processes at these epochs, it is highly probable that age, *per se*, plays a relatively unimportant part in the predisposition to the disease. We cannot, therefore, strictly speaking, confine the tendency to catarrhal disease to any particular stage in the life of the individual. Catarrhal inflammation of the nose and throat, which develops during intra-uterine life, doubtless proceeds from some constitutional vice inherent in the mother, or possibly from some unknown or imperfectly understood placental affection. In this sense we may speak of a nasal or laryngeal catarrh as congenital or inherited.

Inflammatory disorders of the upper respiratory apparatus may be the result of a host of conditions external to the body which arise from man's relation to the outer world, may proceed from agencies within the organism, whose sphere of operation embraces the system as a whole or is limited to its individual parts, or finally, they may be the outcome of defective anatomical and physiological relations—of absence or abrogation of activity in the respiratory structures themselves and in the functions and forces under their control.

The discussion of the causes proceeding from the first source leads naturally to the consideration of the geographical distribution of the affection.

Geographical Distribution. *Predisposing and Exciting Causes.*—The geographical limits of nasal and post-nasal catarrhs are as yet imperfectly defined, but it is highly probable that they bear a close relationship to the distribution of catarrhal affections of the respiratory organs in general over the surface of the earth. Thus it may be laid down as a rule that catarrhal inflammation of the nasal passages is much more frequently met with in cold than in warm countries, in high than in low latitudes. The observations of travellers and explorers show that the nearer we approach the equator the less prevalent become affections of the respiratory apparatus, while in the temperate zone they are the most common of all diseases, and preponderate in these regions according to the proximity of the individual localities to the polar circle. In the temperate zones of both hemispheres catarrhs are more frequently met with in those places which lie between the isothermal lines of 18° and 4° (Seitz). The prevalence of these affections is related not only to the geographical position of a given country, but also to its elevation above the surface of the sea; the higher above the sea-level the more marked the tendency to catarrh (Hirsch, Seitz), a fact partially explicable by the analogy of natural conditions or meteorological relations between high mountainous regions and those of the frigid zones.

In every zone the geographical distribution of the complaint depends, other things being equal, apparently mainly on climatic influences. *In those countries where extremes of temperature follow each other in rapid succession, where the thermo- and barometrical fluctuations are most sudden and occur with the greatest frequency, and where the material composition of the atmosphere is continually changing, catarrhal affections of the naso-laryngeal tract are most frequently met with. The appearance of the disease seems to depend not so much upon the degree of heat or cold as upon the rapidity and intensity of the change from the one to the other.* In warm countries coryza and allied affections most frequently prevail during the sudden cooling of the atmosphere by rain-showers, electrical disturbances, or when the heated condition of the atmosphere alternates with dampness and chilliness of the nights. In a similar manner the more or less sudden passage from a dense to a rarefied atmosphere, as in balloon and mountain ascensions, favors the development of nasal congestion and inflammation.

The influence of season in the production of nasal inflammation is simply a part of the greater question of temperature mutations, and will therefore vary with the period of greatest temperature changes in a given year. While spring and autumn furnish perhaps the largest percentage of nasal and laryngeal catarrhs, the coryza which appears in the summer months, when the air is suddenly cooled or altered by electrical and other disturbances, yields to none in the severity of its symptoms and course.

Let us examine more closely those conditions of the atmosphere principally concerned in the production of catarrhal affections.

The relation of coryza and allied affections to certain states of the atmosphere, such as cold and dampness, is a matter of ancient recognition. While, however, their dependence upon "the weather" has always been a fact of universal observation, the nature of the relationship has been the subject of much controversy and the source of much erroneous opinion. That a causal connection does exist between the two seems, in spite of recent views to the contrary, beyond the necessity of argument, for in this portion of the world who can fail to appreciate the direct relation between the evolution of "colds" and allied catarrhal affections and the vagaries of a climate in which, to use the language of the *Spectator*, we lie down in July and rise in December?

It may safely be affirmed that catarrhal affections are more frequently met with (in the State of Maryland, for example) now than formerly, and lazy minds may not hesitate to find the explanation of this fact in the supposition that our forefathers, with their more limited methods of diagnosis, were less acute observers than the modern specialist armed with rhinoscope, laryngoscope, and speculum. It may even be maintained that our ancestors were a sturdier, more virtuous race, and that they were not surrounded by the depressing environment of the present day and generation. Such speculations are, however, wholly gratuitous and inadequate. The simple truth is that the development of these affections in this section of the country has gone on *pari passu* with its changing meteorological conditions—has followed the general law which governs the evolution and territorial distribution of catarrhal diseases. But, if we had no proof of the influence of climatic conditions in this direction, beyond the facts of everyday experience, weighty evidence of their importance as etiological factors is furnished by the geographical distribution of these affections. For, while there is no climate where catarrhal diseases are not encountered in some form or other, there are certain areas of the globe over which they are principally distributed, and in which the more pronounced types of the disorder are confined within certain more or less clearly defined territorial limits.

Additional proof of the power of climatic conditions in this regard is furthermore shown in the development of catarrhal affections from simple change of residence—removal from an equable climate to one in which the atmospheric conditions are constantly changing will often

induce them, and acclimatization is frequently purchased at the price of a nasal or laryngeal catarrh.

It also occasionally happens that change of residence may beget a predisposition to catarrhal affections, which only exhibits itself upon the return of the individual to his native air.

Let us briefly consider the four principal conditions of the atmosphere which, either singly, in combination, or following each other in rapid succession, are especially provocative of catarrhal affections. These are cold, heat, moisture, and air in motion.

Cold.—The influence of cold *per se* in the production of naso-laryngeal inflammation has been grossly overrated. While the pathological effects of low degrees of temperature upon the circulation and upon the general organism should not be overlooked, if we examine the subject closely we shall find that there are many other agencies at work to explain the prevalence of these affections in that portion of the temperate zone that lies along the higher latitudes. Indeed, the effects of cold are often the reverse of prejudicial. A large proportion of patients affected with catarrhal processes experience marked improvement during the steady cold of winter, and not infrequently a nasal inflammation is notably mitigated or completely dispelled by the appearance of frost. Patients often voluntarily seek the open air in cold weather, experience having demonstrated to them the empirical fact that the heated temperature of the dwelling-house creates more nasal and laryngeal irritation than the cold, biting air of the exterior.

The effect of cold, unassociated with moisture or perturbation of the atmosphere, etc., upon the healthy mucous membrane of the nasal passages is that of a gentle stimulant. The membrane becomes more vascular, the glands are excited to increased secretion, and the sum of the result may be expressed as a healthy reaction, which, so far from doing harm, is in many cases actually productive of good.

Persons who suffer from habitual dryness of the nostrils are benefited notably by the local stimulating effects of cold, and other examples may be instanced in which the same rule holds good. The absolute coldness of a climate is, therefore, of itself inadequate to account for the prevalence of catarrhal affections.

Heat.—On the other hand, a very opposite climatic condition may serve to usher in the catarrhal process. The possible part which heat plays in the causation of the latter is invariably overlooked. The frequent immunity from inflammatory disorders of the respiratory tract enjoyed during the summer months, and the generally accepted proposition that they are more or less clearly confined to the higher latitudes, and that their etiology is inseparably connected with the condition, which, in the idiom of loose medical expression, is known as "taking cold," have withdrawn attention from this agent as a possible factor in the production or aggravation of naso-laryngeal inflammation. Upon this subject my experience furnishes the following observations: There are some persons who suffer from catarrhal affections only during the heated term; in others, who suffer throughout the entire year, the affection is simply aggravated by the heat of summer, while the coryza which occurs during the hot sultry days of our summer months often exhibits a degree of severity not met with in the winter and spring.

In many cases heat seems to encourage the production of various reflex phenomena (notably those relating to embarrassment of the respiratory functions), and it is probable that in its depressant effect upon the nervous system and the slowing of the circulation, is to be found the rationale of its action in this direction.

It is, moreover, a great mistake to suppose that catarrhal affections are little known in the warmer climates of the globe. The type of these affections is greatly modified by climate, and the effect of extreme heat is often to materially increase its severity. Hence, some of the worst forms of nasal inflammation are encountered in the regions and seasons of excessive heat. This proposition may, perhaps, be illustrated by reference to the ter-

rible "nakra" of Bengal, which is probably a severe form of nervous coryza, closely allied to the periodic vaso-motor coryza of our country.

But here again the presence of heat alone is insufficient to account for the prevalence of catarrhal disease.

Moisture.—The association of an atmosphere, surcharged with watery vapor, with heat and cold, is especially productive of nasal and throat affections, the combination of the two conditions sufficing to initiate the inflammatory process, when simple heat or cold alone is powerless to produce the same result. The effect of moisture will depend upon the degree of saturation of the atmosphere. The sudden passage from a cold or temperate condition to a heated, sultry state of the atmosphere, is particularly irritative to the respiratory, and especially the nasal mucous membrane. Here the exciting cause acts probably in two ways: viz., by the saturation and consequent engorgement of the membrane and its underlying structures, and by its depressing effect upon the organism, and more especially the nervous system.

Air in Motion.—Finally, draughts, winds blowing either in one direction or constantly shifting their course, and air-currents in general must be regarded as important agents in the determination of catarrhal affections. In the strata of air of different temperature which they bring with them, and in the rapidity of evaporation which they occasion from the cutaneous and respiratory surfaces, we have the important condition of sudden thermo- and baro-metrical change. In moist cold or moist hot air in motion are found the chief exciting causes combined, and it will be found in practice that this combination represents a most prolific source of inflammatory disorders of the naso-laryngeal tract.

It will be seen, therefore, from the above, that, of external agents, it is not so much cold alone, or heat alone, or moisture alone which is responsible for the prevalence of catarrhal affections, but that the latter depends upon the frequency, rapidity, and intensity of the change from one atmospheric condition to another.

Besides the meteorological relations which condition the geographical distribution of these affections, there are others which pertain to the *geological character of the soil*, to the *configuration of the locality*, and to the *emanations which arise from the surface of the earth*. The two former furnish additional proof in favor of the power of climatic conditions in the evolution of naso-pharyngeal inflammation. It is not within the scope of the present paper to enter into an elaborate discussion of this vast and imperfectly understood question, but it may be said, in general, that the temperature of a given locality will depend, to a certain extent, upon the color of the soil and the presence or absence of vegetation. In some countries—as, for example, in Savoy—the peasants spread dark earth upon the land which they desire to cultivate early, which causes the snow to melt fifteen to twenty days earlier than in other localities (Tortual); it is a well-known fact that the temperature is lowered and humidity of the soil encouraged by the presence of forests or large tracts of dense undergrowth. The presence of vegetation exerts, too, a remarkable influence upon the chemical composition of the air, and hence upon the development or dissipation of nasal and other forms of catarrh. The noxious exhalations from certain forms of vegetable life probably act as indirect or predisposing agencies in the spread of catarrhal disease, while the presence of others, by purifying and tempering the atmosphere or filling it with certain odors, seems to secure immunity from the affection. The sulphurous air of volcanic regions has been utilized from time immemorial in the treatment of laryngeal affections, and the singular infrequency with which the latter are encountered in places where the air is laden with resinous and balsamic odors has been familiar from the earliest times. The *configuration* of a country enters as a factor in the localization of catarrh in so far as it conduces to exposure to the variations in temperature which have been mentioned above.

There are also a vast number of injurious influences dependent upon *modes of life, dress, imperfect sanitary*

conditions, etc., which have been brought forward as the alleged causes of localization of catarrhal affections of the respiratory tract, which, although exercising an undoubted irritating effect, are nevertheless purely secondary and accidental, and have led to crude hypothesis and hasty generalization concerning the essential causes of these diseases.

There are a multitude of conditions, which follow as the natural results of imperfect sanitation and professional occupation, which act as predisposing, and often exciting, causes of nasal inflammation. In general it may be said that residence or work in a confined or overheated atmosphere, or in one filled with impure gases or floating particles of organic or metallic matter, conduces to the development of the disease. Thus it is well known that artisans who are subjected to a dusty atmosphere—tobacconists, workers in woollen goods, stonecutters, millers, laborers in chemical works, etc., or in overheated apartments, as, for example, bakers—are thereby rendered more susceptible to catarrhal affections. In addition to the meteorological conditions which prevail in elevated regions, as, for example, the Alps, the finely divided particles of metallic dust suspended in the atmosphere are said to be important factors in determining affections of the respiratory apparatus. The nasal erectile bodies are peculiarly sensitive to the impression produced by certain noxious gases, especially those given off in the combustion of coal, while the furnace heat of the modern dwelling, and the dry, impure air of apartments fed by the majority of coal-burning stoves, and the varying temperatures of the different rooms, create a vulnerability of the mucous membrane which, in our American cities, constitutes a not unimportant etiological factor.

In some parts of our country there is a widespread popular belief that dust is the chief factor in the localization of inflammatory disease in the naso-pharynx. As there are some who ascribe all diseases to the peripatetic excursions of a vagrant micrococcus, so there are others who see in dust the source of all our ills. While it is undoubtedly true that dust, when accidentally lodged in the naso-pharynx, may give rise to inflammation, I believe that comparatively few cases originate in that way. In some of the Western States the prevalence of large quantities of dust in the atmosphere is supposed to determine the geographical distribution of the complaint; but even here, in estimating the amount of injury done by dust in this case, we should not forget the important meteorological changes that condition its presence in the atmosphere, nor should we lose sight of the fact that these localities are thousands of feet above the water-level, a condition that subjects them more easily to impressions made by sudden variations in the temperature, and brings them directly under the dominion of the winds that sweep across the continent from sea to sea. Moreover, when an individual is exposed to an atmosphere filled with dust, the greater portion of the inhaled particles is retained within the nostrils. This is due in a great measure, as I have pointed out elsewhere, to the erection of the turbinated corpora cavernosa, which latter serve, in that respect, a certain teleological purpose. That portion which finds its way into the posterior nares is carried into the lower (not the upper) pharynx, not only by the force of the inspiratory stream, but also in obedience to the law of gravitation. When the atmosphere is unusually dense, as in storms of dust, this erection of the corpora cavernosa is often so considerable as to necessitate mouth-breathing, and it is to a large extent in this way that the lower pharynx and larynx become filled with foreign matter. It is also a notorious fact that in the nasal passages themselves the region of olfaction is much less liable to catarrhal inflammation than the respiratory passage. The nasal pharynx is, therefore, infinitely less liable to inflammation from a dusty atmosphere than either the larynx or lower pharyngeal cavities.

Among the influences which, approaching from the external world, encourage the eruption of naso-laryngeal affections, the chief, and at the same time predisposing, exciting cause, and that which determines the geographical distribution of nasal, naso-pharyngeal, and laryngeal ca-

tarrh, is that combination of varying meteorological conditions which are understood when speaking of a changeable climate; the home of naso-laryngeal catarrh is the land of the greatest and most rapid thermo- and baro-metrical change.*

It follows as a corollary to the above that the type of the catarrh encountered in a given region or country varies with and is chiefly dependent upon the climatic conditions which have been already given.

Turning now from the effect of temperature changes and the direct action of local irritation from substances derived from the external world to the agencies which, operating within the organism, determine the localization of catarrhal disease in the nasal passages and throat, we must confess that the ancients exhibited the greatest shrewdness of observation when they referred these affections to defective digestive processes and lowered powers of assimilation. Catarrhal diseases, according to the fathers of medicine, are due to imperfect "coction"—that is to say, imperfect assimilation—and the resulting discharge or secretion was looked upon as aliment which had not undergone the necessary digestive changes, or, in other words, as half-cooked food. While their notions of the etiology of catarrhal affections were in the main crude and curiously influenced by the prevailing philosophical vagaries of their time, they nevertheless contain an amount of common sense which it behooves us to pause and consider.

It may be said, in general, that all those influences which impair the general health, interfere with the proper circulation, or impair the constituents of the blood, retard the processes of digestion and assimilation of food, or beget a hypersensitive condition of the vaso-motor nervous system, react upon the upper respiratory tract, in common with the other organs of the economy, and predispose, other things being equal, to catarrhal inflammation of the same. Thus the latter is more liable to develop in anæmic persons with weak, relaxed conditions of the tissues, and who lead sedentary lives, and in those of highly nervous organization, than in those of strong and vigorous constitution, and who pass most of their time in active outdoor exercise. The existence of syphilis or tuberculosis in an individual is a constant invitation to catarrhal inflammations of the nose and throat, and the same is true in regard to the rheumatic, gouty, scorbutic diathesis, to chronic alcoholism, and a host of other affections.

Over-indulgence of the appetites, excesses of all kinds, habitual interference with the bodily excretions, notably the intestinal, predispose to inflammatory disease of the naso-laryngeal tract, so that Schneider was not far from the truth when he said that the cure of catarrhs consisted in "sobriety, continuous bodily exertion, and tranquillity of mind."

Besides being predisposed to or conditioned by pathological states of the system as a whole, catarrhal affections of the nose and larynx are not infrequently the result of reflected irritation from its individual parts, as, for example, disease, over-stimulation, or suppression of the functions of the cutaneous (eruptions, suppression of perspiration, etc.), gastro-intestinal (habitual constipation, hemorrhoids, parasites, etc.), or genito-urinary apparatus (Bright's disease, utero-ovarian irritation, etc.), teeth and gums (caries, dentition, etc.), external auditory meatus or middle ear (inflammation, impacted cerumen, parasites, etc.) Let us examine this subject more closely: As the respiratory passages and skin are the sole avenues through which oxygen reaches the blood, and as they are held in close interdependence by virtue of their community of function, it naturally follows that the abrogated activity of the one will necessitate vicarious action on the part of the other. This supplementary or compensative action, if prolonged, sooner or later transcends its physiological limits and eventuates in morbid conditions of the organs, whose machinery has been thereby overtaxed. Familiar examples of this vicarious action are the congestive or

* The alternate subjection of the pharynx and larynx to extremes of heat and cold in the ingesta acts, though to a far less degree, in the same manner in determining catarrhal inflammation as the sudden changes in the temperature of the external air.

inflammatory disorders of the respiratory apparatus which follow sudden or prolonged interference with the cutaneous functions, as in sudden chilling of the external surfaces, or in the exanthemata, in the sudden suppression of tinea capitis and eczema, and finally, in the night-sweats of consumption. One word in regard to the eruptive fevers. The catarrhal naso-laryngeal disease may usher in the attack (especially is this the case in measles), may occur coincidentally with the exanthem, or may follow the disappearance of the latter, or, finally, it may not develop until convalescence has begun. The catarrhal affections complicating the essential fevers may disappear completely during the latter period, but in many cases go on to the chronic state. This is especially true, in my experience, in regard to affections of the naso-pharyngeal space. *There seems to be a special tendency to the localization of the disease in this region, and a large majority of the cases of hyperplastic conditions of the adenoid tissue coming under my observation, are directly traceable to some acute blood-poisoning in infancy, as scarlet fever, measles, diphtheria, etc.* This is doubtless due, to a great extent, to the fact that the naso-pharyngeal affection is overlooked by the attendant; but it may be that the tendency of the eruptive fevers to leave traces of their existence in the glandular structures of the throat (notably the tonsils) may determine diseased conditions of the adenoid elements of the nasal pharynx.

It now and then happens that during convalescence from acute infectious processes irregular fluctuations in the temperature occur, and even a veritable septicæmic condition, inexplicable by the ordinary examination of the functions of the patient, and which depend upon the persistence of the inflammatory process in the retro-nasal space. I have observed this after scarlet fever and diphtheria, but there is no reason why it should not occur in other and allied affections. This is an important practical point, for by simply cleansing the naso-pharynx of decomposing secretion (I find bichloride of mercury to be the best agent for this purpose) the temperature becomes normal and the disagreeable symptoms dissipated. In this connection let me observe that in all infectious processes characterized by inflammatory manifestations in the pharynx the greatest relief to the child may be secured through careful cleansing of the retro-nasal cavities. In diphtheria, for example, the greatest comfort is experienced by attention to this expedient. To digress still further: In the ordinary acute catarrhal throat affections of infancy much comfort may be given, and the tendency to spasm diminished, by careful attention to the nasal and retro-nasal cavities.* There is an old woman's saying, in this part of the country, that "if a croupy child sneezes, it is well." But no one ever thinks of the nasal passages in connection with a croupy infant. Yet there is, nevertheless, always more or less inflammation of the post-nasal passages, and the tendency to spasm may be diminished by cleansing the passages of mucus, especially before the child retires for the night.†

There is an affection of the skin which is observed in connection with certain forms of coryza, and notably that of sympathetic origin, or rhinitis sympathetica. I refer to urticaria. It appears and subsides with the coryza, and seemingly depends upon the imperfectly defined neurosis or vaso-motor influence which is probably the connecting link between the two affections (possibly some functional derangement of the cervical sympathetic).

Passing now to the reciprocal relationship existing between the turbinated nasal tissue and the auditory meatus and middle ear, it is not an uncommon matter in my experience to find that the subjects of chronic nasal inflammation suffer from a more or less constant dryness and

itching of the former or a tendency to the inspissation of cerumen, and this, apart from existing disease of the middle ear. I have on several occasions adverted to the rôle of congestive conditions of the erectile tissue in the production of middle-ear affections (doubtless through reflex influence). It remains for me to call attention to the fact that unilateral coryza, either acute or chronic, sometimes depends upon irritation of the external auditory passage. Two years ago I was consulted concerning a case in which a severe unilateral discharge, with stoppage of the nostril, hemicrania, and other phenomena referable to the same side, of a number of weeks' duration, was completely dissipated by the removal of a mass of impacted cerumen from the ear of the affected side; and recently, a similar case has come under my professional care, in which the swelling of the erectile tissue disappeared upon removal of the ceruminous plug. In the presence of these facts the conclusion is irresistible that an intimate physiological relationship exists between the nasal cavities and the auditory meatus.*

It has thus been shown that nasal and laryngeal inflammation may proceed from the direct or indirect (reflex) irritation of a host of substances derived from the external world, from an almost indefinite number of pathological conditions of the system as a whole, or from irritation or disease of organs distant from the seat of local inflammation. The predisposing influence of certain structural peculiarities of the nasal chambers remains to be briefly adverted to. These consist most commonly in deflection (or malposition) and perforation of the septum, anomalous conditions of the turbinated bones (hypertrophy, abnormal position, atrophy?), and disturbance of the anatomical relations of the nasal fossæ, either through accident or disease. There are certain anomalies of structure of the throat and nasal passages that are seen in several members of the same family which are undoubtedly inherited, and which are of such a nature as to give rise to no inconvenience, or, on the other hand, encourage the development of inflammatory processes; in the latter case their influence is purely mechanical. There also exists in some families a peculiar vulnerability of the mucous membranes of the nose and throat, which is sometimes conspicuous for several generations. Such persons are said to "inherit" catarrhal inflammation, or to be the subjects of the "catarrhal diathesis"—a view which has descended to us chiefly from the earlier French physicians. It is undoubtedly true that the children of parents debilitated by disease, excesses, or other causes, or who inherit, for example, the enfeebled constitution of the syphilitic or tubercular, diatheses well known as predisponents to catarrh, may, by virtue of the inheritance of a vice of constitution, yield more easily than those of healthy parentage when exposed to the exciting causes of the disease; but there is no evidence yet adduced that puts beyond a reasonable doubt the descent of a simple inflammation from father to son. These remarks apply with equal force to the so-called catarrhal diathesis, which latter may be looked upon simply as a generic term for a multitude of varied physical peculiarities, each susceptible, upon close analysis, of reference to a definite and tangible cause, or to a combination of injurious influences.

Catarrhal inflammations of the nose and throat in the newly born, when not due to gonorrhæal inoculation, probably owe their origin to causes operating during intra-uterine life.† It occasionally happens that inflammatory affections of these cavities are ushered in at some physiological epoch, as puberty, or existing disease dissipated by the nutritive changes which occur at that period. The sub-acute laryngitis which occurs at puberty occasionally de-

* In this disease, too, the paralytic condition of the palatal muscles interferes materially with the voluntary removal of secretion from the retro-nasal space.

† The influence of the febrile state is also occasionally exerted in the direction of cure of existing catarrhal disease of the nasal passages and throat. This is especially true of those affections with special tendency to local manifestation in the throat, and the cure may be permanent or temporary. I have also observed complete disappearance of a naso-pharyngeal catarrh during the course of malarial fever. (See paper read before the Am. Laryngological Association, May 12, 1884.)

* In certain persons, notably those of highly developed nervous organization, or in the hysterical or hypochondriacal, coryza is occasionally produced by direct impression upon the olfactory nerve, or, from simple association of ideas, by physical or mental over-exertion or emotional excitement. Here there is usually some coexisting local nasal disease or vaso-motor neurosis, and such cases are closely allied to, if not a part and parcel of, the sympathetic form of rhinitis (rhinitis sympathetica). (See abstract in Maryland Medical Journal, April 11, 1885, of paper read before the Clinical Society.)

† See article by the author in Phila. Medical News, October 4, 1884.

velops into a chronic inflammation, especially in the subjects of inherited constitutional vices—a fact which it is well to bear in mind both in a prophylactic and prognostic point of view. Inflammatory conditions of the throat and nasal passages occasionally make their appearance at the menstrual period, appearing either coincidentally with the uterine hæmorrhage or as the vicarious representative of that process, and I have seen one case where a catarrhal affection of these passages ushered in the menopause and subsided with the termination of menstrual life.*

Etiology of Pharyngeal and Laryngeal Inflammation.

—The chief predisposing causes of acute pharyngo-laryngeal inflammation are the existence of chronic hyperæmia or inflammation of the naso-bronchial tract, abnormal state of vitality from inherited or acquired disease, excesses, subjection to imperfect sanitary conditions, and constant confinement to a vitiated atmosphere. While in the vast majority of instances acute inflammation of the pharynx or larynx occurs as a complication of acute or chronic naso-pharyngeal (or bronchial) catarrh, it may nevertheless be met with as a primary affection. I do not share the extreme view of my friend Dr. Bosworth, who has written so well upon this subject, that acute laryngitis only occurs as a symptom of the chronic form. While I regard the existence of the latter as its most prominent predisposing cause, it is nevertheless true that the disease may appear as a primary affection limited to the laryngeal or pharyngeal structures.

Apart, then, from the inflammation resulting from local pathological processes, mechanical or chemical injury, abuse of the forces of expiration and inspiration, the isolation of this disease in the larynx (acute primary laryngitis) is one of the rarest of pathological events. In adult and infant it most commonly occurs as a complication of acute nasal catarrh, or as a part of a general inflammatory condition of the naso-bronchial tract. I am inclined to believe that in the irritable state of the nasal tissues and notably the cavernous bodies, resides an important etiological factor in the adductor spasm which characterizes the disease in the infant; the engorgement of the sensitive area when the recumbent posture is assumed and the gravitation of the nasal secretions into the laryngeal vestibule being the most important agents in awakening the reflex laryngeal spasm. In the adult, acute catarrh of the larynx is a relatively rare disease, a fact which is remarkable, as Flint¹ has pointed out, in view of the frequency of acute pharyngeal inflammation, and illustrates the conservatism of the natural law in regard to the extension of inflammation.

The reflex or collateral hyperæmia of the larynx which is present in inflammatory conditions of the nasal and pharyngeal cavities is too often mistaken for acute inflammation, and confusion too often arises, especially when the laryngoscope is not available, from failure to remember the simple truth that hoarseness is not laryngitis.

Chronic catarrhal laryngitis as an isolated affection is rarely met with; it is almost invariably secondary and associated with inflammatory disease of the nose or nasal pharynx, upon which it, in the large majority of cases, depends. Indeed, setting aside the inflammation which results from purely local irritation, it may be laid down as a law that the vast majority of cases of catarrhal, pharyngeal, and laryngeal disease originate primarily in inflammation of the nasal cavities. Catarrhal rhinitis leads to inflammation of the pharynx and larynx in one or all of the following ways:

1. By mouth-breathing, which, I may say, acts not only through the irritation of the cold, dry, and impure air inspired through the mouth, as in nasal obstruction, or through the nasal passages, as in atrophy of the turbinated structures, but also by crippling the respiratory and vocal forces, shortening both inspiration and expira-

tion, compelling rapid respiration and resulting vocal and respiratory fatigue.

2. By the constant endeavor to overcome the loss of nasal power and resonance, and the consequent pharyngeal and laryngeal fatigue.

3. In certain cases, by interference with the normal motility of the palatal structures.

4. Through reflected irritation.

5. By the irritation of the atmosphere, vitiated in some instances, not by virtue of its passage through the mouth, but through the nasal chambers themselves.

6. By so-called extension of inflammation.

7. Possibly by irritation of secretion.

In studying the pathological conditions of the naso-pharyngeal space and middle ear, we may, for practical purposes, regard these cavities as accessory to the nasal chambers, so intimately interwoven is their pathology with a diseased condition of the nasal fossæ. As stated elsewhere,⁸ in a large proportion of cases of so-called middle-ear inflammation the latter "is merely a symptom of nasal catarrh, and gradually disappears without special treatment upon the removal of its primary cause." When the middle-ear affection is thus symptomatic, it is generally traceable to mechanical causes or to reflected irritation.

Inflammatory conditions of the naso-pharyngeal cavities are encouraged, and existing disease of these structures perpetuated by paralytic conditions or defective muscular power (*e.g.*, from existing chronic inflammation, enlarged tonsils, defective innervation, etc.), or from abnormal approximations of their walls (from adhesions). As a consequence of the impaired functional exercise of the structures thereby induced, congestive and catarrhal processes develop in the laryngeal cavity, which result from the constant endeavor by abuse of the expiratory forces to overcome the loss of power in the pharynx. Both loss of power and adhesions, which latter act by crippling muscular action and disturbing normal anatomical relations, tend also to prevent voluntary cleansing of the retro-nasal space, and thus form another factor in the persistence of the chronic inflammatory process.

Finally, I wish to observe that in a large proportion of cases it will be found, upon careful examination, that the existence of the nasal, pharyngeal, or laryngeal affection is not due to any one particular cause, but to a combination of injurious influences—the resultant of a number of internal and external forces.

HYPERÆMIA OF THE LARYNX AND TRACHEA.—Hyperæmia of the larynx and trachea may be active or passive, acute or chronic, according to the causes to which it owes its existence. In addition to those which determine hyperæmia and catarrhal inflammation of the mucous membrane of the respiratory tract in general (*vide* article on Etiology of Catarrhal Affections), hyperæmia of the laryngo-tracheal membrane occurs as the result of mouth-breathing from nasal and post-nasal obstruction, by extension from adjacent cavities, or as a purely reflex phenomenon from disease or irritation of the ear, nose, pharynx, and buccal cavity, and in some instances from over-stimulation or disease of the generative tract. Hoarseness and congestion of the larynx have been observed, too, in connection with the presence of parasites in the intestines and hæmorrhoidal affections. Faulty methods of singing and breathing, and especially, as Mandl⁹ has pointed out, the habitual use of the clavicular method of respiration, the irregular use of the voice, loud declamation, singing, etc.; in fine, anything which induces fatigue of the vocal organs, will culminate in laryngeal hyperæmia. Long-continued and violent paroxysms of coughing may induce it, but their influence has been doubtless overrated. The habitual use of alcohol, and in some persons tobacco; the unnatural gratification of the appetites; constant exposure to the fumes of irritating gases and vapors; confinement to an impure, close, dusty, or overheated atmosphere, and the use of comforters and other forms of neck-wrap predispose to congestive disorders of the laryngo-tracheal membrane. It occurs as a complication of syphilis, tuberculosis,

* See on this subject a paper by the author, on Irritation of the Sexual Apparatus as an Etiological Factor in the Production of Nasal Disease, *Am. Jour. of the Med. Sci.*, April, 1884. (Prize Essay, Maryland Academy of Medicine.)

rheumatism, gout, Bright's disease, malarial poisoning, the acute infectious diseases, influenza and coryza; of growths, ulcers, foreign bodies, and certain diseases of the œsophagus and thyroid gland.

Passive hyperæmia of the larynx and trachea is present in chronic valvular diseases of the heart and obstructive lesions of the lungs; in compression of the neck, thorax, or abdomen by articles of clothing, tumors, aneurisms, enlarged glands, hypertrophied thyroid, abscess, etc.; in fine, anything that tends to produce obstruction to the venous circulation of the throat and neck.

The change of voice at puberty is associated with more or less laryngeal hyperæmia. Elongation of the uvula, if it act, as has been alleged, as an excitant of laryngeal hyperæmia and cough, probably does so through the medium of reflex action and not from direct irritation of the laryngeal membrane.*

Hyperæmia of the larynx occurs from the presence of foreign bodies in the œsophagus, or from disease of its membranous or muscular coats, and in certain pathological conditions of the thyroid gland. It also occurs in some females at the menstrual period, in the course of pregnancy, and during or after coition. It may complicate paralytic conditions of the intrinsic muscular apparatus of the pharyngo-laryngeal tract, or occur as a manifestation of hysterical and hyperchondriacal affections and pathological states of the brain and spinal cord. Pressure on the recurrent laryngeal nerves sometimes induces hyperæmia through vaso-motor influence reflected through the superior cervical ganglion.

Eppinger calls attention to the fact that, in suffocation from direct mechanical compression, venous hyperæmia does not occur, while the pharynx becomes deeply cyanotic; and offers as an explanation of this fact the protected situation of the thyroid artery, the easy escape of venous blood into collateral channels, and an especially well-marked contractility of the arterial vessels.¹⁰

Hyperæmia of the larynx occurs from suppression of the functions of the skin, or from the sudden disappearance of a cutaneous exanthem.

I would call special attention to the laryngeal hyperæmia which sometimes results, not from excessive vocal strain and fatigue, but from habitual or intermittent disuse of the voice. Systematic functional exercise is necessary to the physiological integrity of the vocal apparatus. In voluntary or enforced rest of the voice, if prolonged, a passive hyperæmia is occasionally produced of sufficient pathological importance to demand the recognition of the practitioner. This, which may be termed hyperæmia from disuse of the vocal forces, is especially well marked in public speakers and singers in the intervals of rest from professional labors, and disappears without treatment upon the resumption of the same.

The systematic use of the voice is a safeguard against congestive conditions of the larynx; its irregular use, on the other hand, often predisposes to the opposite result. Thus, for example, the public speaker who makes daily professional use of the voice is much less liable to yield to conditions productive of hyperæmia than he who exercises his vocal muscles to the same extent, but at longer intervals.

A certain degree of hyperæmia may exist without impairment of function, even in those who habitually use the voice in the exercise of their professional duties. It is not uncommon, for example, to find a more or less congested or muddy condition of the cords in public speakers and singers, and that without the slightest abrogation of their vocal powers.

The laryngoscopic appearances consist simply in localized or diffuse injection of the mucous membrane, with a peculiar pinkish coloration of the cords due to dilution of the rays of the reflected light.

The parts most frequently affected are the interarytenoid fold, the vocal cords, the mucous covering of the

arytenoid cartilages and the epiglottis. The normal lustre of the tracheal rings becomes dulled, and the spaces between them dark and congested. The color of the membrane varies greatly according to the causes which produce the hyperæmia. It may be said, in general, that the hyperæmia which results from arterial dilatation produces a brighter coloration, while that which follows venous obstruction, and that occurring in low forms of acute disease, expresses itself in darker shades of red. Occasionally, and especially is this the case in arterial congestion, small ecchymotic spots are discovered which represent small capillary hæmorrhages. In long standing cases, when the hyperæmia is due to some obstruction to the circulation, a varicose condition of the vessels is found, which has been compared to analogous hæmorrhoidal conditions of the rectum.

A peculiar mottled appearance of the mucous membrane, and especially of that covering the vocal cords, is said by some to be characteristic of syphilis, but it may also occur in other conditions. If this mottled condition, however, be bilateral and symmetrical, it should arouse a certain amount of suspicion as to the nature of the disease, and direct attention to its possible specific origin.

The *microscopical appearances* consist simply in dilatation and engorgement of the blood-vessels of the upper layers of the membrane. The thickening of these structures and the œdematous infiltration which are observed in long-standing cases of venous congestion, are more probably referable to commencing catarrhal inflammation than to a purely vascular disturbance.

Symptoms.—A certain degree of laryngeal hyperæmia may exist without exciting attention, its presence being detected only by accident or during the professional use of the voice. When limited to the interarytenoid fold, it manifests itself as a short, hacking, explosive cough, generally accompanied or preceded by a sense of tickling, usually referred to the region of the crico-thyroid space. When the cords are involved the voice becomes veiled, loses its tension, becomes easily fatigued, and hoarseness of different grades supervenes. The larynx feels dry and sometimes painful sensations are complained of after smoking, drinking, or indulgence in excesses of any kind, or after the use of the voice in singing or speaking.

The *Prognosis and Treatment* will obviously depend upon the causes that condition the hyperæmia. These should be carefully sought for, and, if possible, removed. The measures addressed to the larynx itself consist in soothing inhalations, and mild astringent and alterative sprays. A weak solution of an astringent in oil or glycerine, or the oil alone, will be found most soothing to the irritable mucous membrane. For the tickling and cough a powder containing boracic acid and morphia, allowed to dissolve slowly on the tongue, or lozenges of guaiac, cubebs, cocaine, and similar substances may be confidently recommended.

In cases of persistent laryngeal hyperæmia due to loss of vaso-motor control, much benefit may be derived from tonics addressed to the nervous system.

HÆMORRHAGE FROM THE LARYNX AND TRACHEA.—Hæmorrhage from the larynx and trachea occurs as the result of mechanical or chemical injury, as a symptom of various pathological conditions, or it may be the vicarious representative of a physiological process.

The hæmorrhage which results from traumatism generally takes place into the submucous areolar tissue, and is commonly associated with more or less laryngeal œdema. It may occur directly after the accident, or several days thereafter, as in the case reported by Barbillier,¹¹ in which hæmorrhage with consecutive fatal œdema took place six days after an incised wound between the thyroid cartilage and hyoid bone.

Violent expiratory efforts, as in paroxysms of coughing, loud declamation, or forced intensity of the voice from any cause, may give rise to extravasations of blood, which usually come from the small vessels which course along the edges of the cords. In these hæmorrhages, which take place upon the upper surface of one cord, both being rarely affected, the clot may form beneath the membrane, or rupture of the latter may occur, with extravasation

* The elongated uvula rests upon the dorsum of the tongue, and does not insinuate itself into the laryngeal cavity. Moreover, it would require an uvula of extraordinary length to impinge upon those portions of the larynx that are concerned in the production of cough.

upon the surface of the cord. The affected cord may or may not be suffused.

Capillary hæmorrhages, or apoplexies, are found not infrequently in inflammatory conditions of the larynx (see sections relating to these subjects) in purpura, scurvy, hæmatophilia, and allied affections, in hæmorrhagic smallpox, and from the toxic or "idiosyncratic" influence of certain drugs, as phosphorus, mercury, chromium, antimony, and other agents eliminated through the mucous membrane of the respiratory tract.

More or less bleeding is common to all ulcerative processes in the larynx; in carcinoma and tuberculosis it is not infrequently the immediate cause of death, and a case is recorded by Türck in which the latter occurred from erosion of the lingual artery from a syphilitic ulcer of the right sinus pyriformis (see article on Larynx, Syphilis of). In women suffering from catarrhal disease of the larynx, hæmorrhage occasionally takes place at the menstrual epoch, or it may occur in the normal larynx as a vicarious flux. Tobold¹² relates a case in which hæmorrhage of the vocal cord occurred during the vomiting of pregnancy.

Erosion and thinning of the walls of the trachea by an aneurismal or other form of tumor may lead to alarming hæmorrhage from the windpipe. The blood may be expectorated at intervals and in small amounts at a time, or sudden perforation may occur, and immediate death ensue.

Hæmorrhage from the larynx occasionally takes place from the rupture of varicose veins during violent expiratory efforts.

The hæmorrhage occurring in the course of catarrhal affections, or as the result of vocal strain, is usually inconsiderable in amount and need not excite alarm, extensive idiopathic fatal hæmorrhage, as in the cases of Bogros¹³ and Pfeufer¹⁴ being probably exceedingly rare.

Under the title "Laryngitis Hæmorrhagica" Fraenkel¹⁵ and others have described a parenchymatous hæmorrhagic infiltration of the mucous membrane which occurs apart from any specially well-marked indication of laryngeal disease, but there seems to be no legitimate anatomical reason to justify such a clinical refinement.

The hæmorrhage which follows operations on benign growths in the larynx is, as a rule, trifling in amount. When old adhesions from syphilis, etc., have to be divided it is, however, often considerable, and a case is recorded in which ligation of the carotid was necessary to arrest the bleeding produced by the division of a syphilitic adhesion with the galvano-cautery.

Slight hæmorrhage manifests itself in a reddish or reddish-brown discoloration of the sputa. Hæmorrhage into the substance of the vocal cords may be suspected when sudden and complete aphonia, accompanied or followed by tickling or pain in the larynx, occurs during the over-use of the voice, and is followed by the expectoration of a small quantity of clotted blood; especially if after such an event there is a painful sensation in the throat upon attempted phonation. When the hæmorrhage is extensive, as occurs, for example, in certain low forms of fever, symptoms of laryngeal obstruction at once supervene which call for tracheotomy, or which may be relieved by the expectoration of the clots, as happened in the case of Fraenkel.

The local application of astringents by cotton carrier, spray, or powder, either alone, or assisted by the swallowing of cracked ice, or by hypodermatic injections of morphine, is generally sufficient to arrest most hæmorrhages proceeding from the larynx. In extensive hæmorrhage with œdema scarification should be at once resorted to, and in the event of failure to relieve the urgent dyspnoea no time should be lost before resorting to tracheotomy.

ACUTE CATARRHAL LARYNGITIS.—*Historical Sketch.*—The history of laryngeal inflammation is coextensive with the literature of laryngology. Laryngitis, although often confounded by the ancients with pharyngitis and diseases of the tonsils, has always been one of the most common affections to which the human race is liable. While, then, it does not come within the scope of the present work to offer a complete historical narrative of this affec-

tion, it may be interesting to refer very briefly to the writings of those who, in the prelaryngoscopic era, chiefly directed attention to the larynx as a frequent seat of inflammatory processes.

In the ancient Hindoo system of medicine, coryza and catarrhal affections in general were supposed to arise in some vague manner from the three sources, which the writers of that period looked upon as the fountain-heads of all diseases, viz., the bile, the air, and the phlegm. Hippocrates and his followers taught that the vapors arising from the body excited in the brain a secretion which flowed down into the nose through the perforations in the cribriform plate, and through the ethmoidal and sphenoidal cells. Galen went so far as to assert that the pituitary gland and the ventricles were the reservoirs from which the discharge was obtained.* These views of the Greek physicians, whose notions of the etiology of disease were curiously influenced by the prevailing philosophical doctrines of their time, were followed by those of the Arabian school, which were imported into Europe and prevailed on the Continent as late as the seventeenth century, when they were completely overthrown by the colossal labors of Conrad Victor Schneider.¹⁶ It is true that Van Helmont¹⁷ had long before assailed with consummate satire "the gray-haired dreams of the Grecians;" that Cardan¹⁸ had previously shown that the secretion came sometimes from the secreting portions of the nasal mucous membrane, and that Botal¹⁹ had entered an anatomical protest against the hypothesis of the ancients; but it is chiefly due to the exhaustive anatomical researches of Schneider that their absurdity was demonstrated.

According to Schneider, catarrh is a disease of the blood which manifests itself as a discharge of mucus from the vessels of the various mucous membranes of the body. Among the external causes of the disease the dampness which comes from certain conditions of the atmosphere was supposed to enter the circulation through the pores of the skin and excite catarrh in the different organs. In this way, too, vitiated air, entering and stirring up the blood, was supposed to account for the epidemic occurrence of coryza.

Schneider²⁰ gave a good description of laryngitis under the title of "Catarrh of the Posterior Pituitary Membrane," and his versatile contemporary, Severinus,²¹ dilated upon the subject with considerable detail.

About the middle or latter part of the seventeenth century, the illustrious Sydenham²² described inflammatory affections of the upper respiratory tract under the generic term "quinsy," and looked upon them, as did Hippocrates²³ before him, as diseases of the spring.

In 1675, an excellent treatise on the voice and its affections appeared, written by Schelhammer,²⁴ who, following the ancients, included laryngeal inflammation under the terms *rauvedo* and *aphonia*.

In 1688 Ettmüller²⁵ described the disease as it occurs in children, and in 1680, Lower,²⁶ evidently inspired by the discovery of Harvey, and the anatomical researches of Schneider, devoted an essay to the pathological nature of catarrhal affections. Among the many special treatises and essays which appeared in the seventeenth century, the dissertation of Hannæus²⁷ deserves special mention, as an excellent exposé of the etiology of laryngeal affections.

In the following century Bonetus,²⁸ inspired by the experience of Spigelius, adverted to inflammation of the larynx, and Boerhaave,²⁹ and later his learned and devoted commentator, Van Swieten,³⁰ showed their knowledge of the various forms of laryngeal inflammation by the accuracy and thorough-going way in which they described them.

The writings of Boerhaave, and later Schacht,³¹ were taken up by their pupils and followers, and a large number of theses appeared, among which the dissertation of Esgers³² deserves special commendation.

In 1760 Morgagni³³ prepared the way for the study of the pathological anatomy of the disease, and endeavored

* For the various theories concerning the nature of catarrhal processes, see the article on Nose, Catarrhal Affections of.

to stimulate research in the direction of laryngeal affections. Neglected by contemporaneous, and subsequent observers, the subject was again prominently brought into notice by the observations of Benjamin Rush³⁴ in this country, and John Millar in England.³⁵ The literature which followed the publications of Rush and Millar is enormous, and amounts simply to a confusion of acute and chronic laryngitis with asthma, croupous laryngitis, and various reflex laryngeal neuroses. Of his contemporaries, Josef Peter Frank³⁶ seems to have had the clearest conception of the laryngeal affection, which he portrayed in a chapter which, for terseness of style and accuracy of description, outranks the productions of his predecessors.

In the meantime, Hoffmann³⁷ had advanced the view that catarrh was the local expression of a general febrile state, and that the appearances on the mucous membranes were evoked by the irritating properties of the serum and lymph, which were cast off as a critical discharge from the glandular parts. Hence, among subsequent writers, the inflammatory affections of the nose and throat are lost in the inflammatory fever, or febris catarrhalis of the last century.

In 1799 the attention of the medical world was forcibly called to acute laryngeal inflammation by the death of Washington. At this time the disease was scarcely recognized as an independent affection.

In the early part of the present century the subject of laryngeal inflammation received considerable attention at the hands of Vogel³⁸ and Reil,³⁹ in Germany, and Cabanis⁴⁰ and Portal,⁴¹ in France, and a number of cases illustrative of its pathological anatomy were collected by Van der Bosch,⁴² Voigtel,⁴³ and Otto.⁴⁴

About this time Pinel⁴⁵ taught that catarrh was an inflammation or exaggeration of function of the mucous membrane—a view which soon obtained a foothold among his contemporaries.

Up to the year 1808 the greatest confusion prevailed concerning the acute form of laryngeal inflammation. By the majority, or perhaps all, of the writers of that period the disease was unknown, or confounded with various spasmodic affections. The first to distinctly announce its existence as a separate disease seems to have been Dr. Dick,⁴⁶ who, in an article on croup, described acute laryngitis under the title *Cynanche Laryngea*. Four years later the same affection was described as a new disease by Matthew Baillie,⁴⁷ Everard Home,⁴⁸ and Farre;⁴⁹ and later on the more chronic form of the disease was portrayed by Albers,⁵⁰ in Germany, Porter⁵¹ and Stokes,⁵² in Dublin, Ryland,⁵³ in England, and Chapman⁵⁴ and Swett,⁵⁵ in America.

In 1846 appeared the work of Horace Green,⁵⁶ which was destined to revolutionize the treatment of laryngeal affections, and to throw new light upon their pathology. Green's researches form an epoch in the study of laryngeal inflammation. The universal comment which they excited led to a number of communications upon the subject, which were followed some years later by the dawn of the laryngoscopic era.

Varieties of the Disease.—There are two forms of acute catarrhal laryngitis. In the one the morbid process is limited to the mucous membrane, while the other is characterized by its extension to the submucous connective tissue. The former is not infrequently met with; the latter, when not produced by direct violence or acute infectious processes, is a much rarer type of disease.

Etiology.—The existence of hyperæmia and chronic inflammation of the naso-bronchial tract, a lowered state of vitality from inherited or acquired disease, excesses, subjection to imperfect sanitary conditions, and constant confinement in a vitiated atmosphere are the chief predisposing causes of acute catarrhal laryngitis. The disease generally occurs as a complication of acute nasal or bronchial catarrh, and rarely from extension of inflammation from the lower pharynx. The infrequency of its occurrence in the latter case, as Flint⁵⁷ has pointed out, is remarkable, in view of the frequency of acute pharyngeal inflammation, and illustrates the conservatism of the natural law in regard to the extension of inflammation.

Acute laryngitis complicates scarlet fever, measles, and

other essential fevers, and has been observed as a leading feature during the epidemic occurrence of certain diseases, notably erysipelas. A subacute form is often present in so-called "influenza," and "hay-fever," and allied disorders, and may even exist as a complication of certain cerebro-spinal affections.⁵⁸ It must be remembered, on the other hand, that some diseases of the cervical cord may so simulate laryngitis as to render resort to the laryngoscope necessary to diagnosis.⁵⁹

Acute laryngitis occasionally results from the suppression of a rheumatic or gouty attack. In the former disease, the inflammatory action may or may not proceed from the articulating surfaces of the larynx, and Klencke⁶⁰ has described an "inflammatory aphonia," which occurs after suppressed gout leading to exudation into the muscles and nerve-sheaths.

A mild form of catarrhal laryngitis is occasionally seen as the result of reflected irritation from remote or adjacent organs of the body, as the skin, the genito-urinary and gastro-intestinal tracts, the teeth, gums, tonsils, turbinated nasal structures, external auditory meatus, thyroid gland, œsophagus, etc.

A violent form of acute laryngitis follows the inspiration of flames, boiling water, the incautious use of instruments and certain topical applications, the presence of foreign bodies, and various surgical injuries of the larynx and neck. (See also Glottis, *Edema of the*.)

Abuse of vocal intensity, as, for example, in forced declamation, screaming, etc., may precipitate a mild attack of laryngeal catarrh. (See also section on Etiology of Catarrhal Affections.)

Pathological Anatomy.—The pathological appearances are those of simple catarrhal inflammation. There is more or less diffuse swelling of the entire mucous membrane, or the process may be limited to individual portions of the larynx, as the ary-epiglottic folds and epiglottis, and even the vocal cords may be alone affected, the remaining portions of the larynx participating but slightly in the inflammation. The hyperæmia is not always well marked after death, a fact due, as Niemeyer⁶¹ has pointed out, to the richness of the laryngeal membrane in elastic tissue, and the consequent expulsion of the blood from the capillaries during the post-mortem contraction of its fibres. The writer recalls cases where the laryngeal mucous membrane of those dying during the existence of acute laryngeal catarrh presented the very opposite condition from that of injection, and in which the only evidences of a pre-existing inflammatory condition consisted in slight desquamation of the epithelium, and minute extravasations of blood into the substance of the mucous membrane.

Superficial erosions of the mucous membrane are not infrequently met with, and are due not only to the inflammatory process, but also, in some instances, to the loosening of the epithelium from violent expiratory efforts. It is questionable whether true ulceration ever occurs as a result of acute catarrhal laryngitis.

The swelling is not always confined to the superficial layers, but involves the deeper portions of the membrane with their glandular constituents. In the secretion, therefore, in addition to the cast-off cells of the upper layer and the lymphoid corpuscles, we find the epithelial elements of the glands themselves. It is the preponderance of these so-called "mucous cells" that gives to the secretion its peculiar frog-spawn appearance.

Symptoms.—Acute inflammation of the larynx may develop insidiously, the symptoms at first resembling those of hyperæmia or a mild form of subacute inflammation; or its onset may be sudden and severe. The voice, at first shrill, hoarse, uncertain, becomes rapidly aphonic; pain is felt in its attempted use, and disagreeable sensations, referred to the presence of a variety of foreign substances (pins, hairs, sand, etc.) in the throat, are constantly present, which provoke a short, hacking cough, and ineffectual efforts to clear the throat. Tenderness of the larynx on pressure is sometimes complained of, and a sense of constriction; but these symptoms are generally inconspicuous in the superficial form of the disease.

Respiration is rarely embarrassed, except in children and in the parenchymatous variety of the disease. In the latter the amount of its impairment depends not only upon the degree of swelling, but also upon its anatomical seat.

At the outset the laryngeal secretions are arrested, the throat feels dry and rough, and the paroxysms of coughing are ineffectual. Later, there is a mucous expectoration, resembling somewhat frog-spawn, which is sometimes streaked with blood, and which becomes mucopurulent as the disease undergoes resolution. Febrile movement, if present, is not, as a rule, well marked.

In children the small size of the rima glottidis, the imperfectly developed and more vulnerable laryngeal structures, and the notable tendency to spasmodic affections of the larynx, combine to make the affection one of considerable gravity. The symptoms detailed above are accentuated, and the suffering is much more intense. The cough assumes a peculiar stridulous, or shrill metallic, "croupy" character, which has suggested the synonyms "inflammatory croup," "stridulous laryngitis," "laryngitis spasmodica," "pseudo-croup," etc.

Acute catarrhal laryngitis in children is characterized, then, by the occurrence of suffocative attacks of glottic obstruction, which are paroxysmal in nature, and which take place nearly always during sleep. During the paroxysm the symptoms are those of laryngeal obstruction or stenosis (see articles on these subjects). The character of the breathing will depend upon the portions of the larynx involved. If the upper part alone be affected, the dyspnoea will be wholly inspiratory, while if the entire surface become swollen or oedematous, both acts of respiration will be embarrassed. During the attack, which varies greatly in duration, death seems imminent; the temperature rises often to a considerable height, and there is hardness and increased frequency of the pulse. A painful, abortive cough adds to the intense suffering, symptoms of asphyxia develop, and coma and convulsions may ensue. Generally, however, the paroxysm is terminated by vomiting, or by the copious expectoration of a mucopurulent secretion, the alarming symptoms subside, and the child falls asleep, probably from the drowsy condition determined by the excess of venous blood in the brain. In some cases, in which the attack has been of long duration, the little patient may pass from this drowsy condition into a state of coma or delirium.

The spasmodic dyspnoea, which is characteristic of the disease in children, has been variously interpreted. According to some, its explanation lies in the spasmodic approximation of the vocal cords from the reflex adductor spasm, and in the relatively small size of the glottis in children. Others, again, as for example, Ziemssen⁶² and M. Mackenzie,⁶³ attribute it to obstruction of the glottic orifice during sleep by inspissated mucus. It is more than probable that both of these views are partially true, and that the chain of events may be as follows: (1) Gravitation and accumulation of inspissated mucus, not in the glottic chink, but in the interarytenoid fold (laryngeal cough area), to which it is directed by the recumbent posture; (2) stimulation of this area, and (3) resulting reflex adductor spasm.

The writer is inclined to lay stress upon the swollen and irritable condition of the nasal tissues, and notably the cavernous bodies, as an important etiological factor in the production of the adductor spasm of this disease, the engorgement of the sensitive nasal area (*vide* Nose, Neuroses of) when the recumbent posture is assumed, and the gravitation of the nasal secretion into the vestibule of the larynx being the most important agents in awakening the reflex laryngeal spasm. In some cases, at least, the acute laryngitis, so called, is simply a symptom of nasal irritation, and will subside upon appropriate treatment of the nasal cavities.

The *laryngoscopic appearances* are redness and swelling of the affected portions of the mucous membrane, with the occasional presence of minute capillary hæmorrhages or illy-defined erosions. During life the latter are inconspicuous and liable to be overlooked. Inspection not infrequently reveals the fact that the changes in the voice

may be due not only to the inflammatory condition of the cords themselves, but also to the interference with their mobility from the mechanical obstruction offered by the swollen mucous membrane. Thus the approximation of the vocal ligaments may be prevented by swelling of the interarytenoid or anterior commissures, or by great thickening of the ventricular bands. Ziemssen,⁶⁴ however, thinks that the hoarseness of the voice depends more often upon some imperfectly understood change in the innervation or in the muscles of the larynx themselves, leading to an inequality in tension of the vocal cords. This, furthermore, explains, according to the same writer, the peculiar shrillness and jarring character of the voice in the early part of the disease, as well as the bowed condition of the cords and patency of the respiratory glottis which are sometimes seen on laryngoscopic examination.

Secretion is usually scanty, and is generally found on the surface of the cords or issuing from the ventricles. Occasionally the mucous membrane has a whitish appearance, as if brushed over with nitrate of silver (Türk), due to cloudy swelling of the epithelium.

The symptoms of the parenchymatous form of acute laryngitis are those of laryngeal oedema and stenosis. (See articles on these subjects.)

Complications and Sequelæ.—Acute inflammation of the larynx may be complicated by acute coryza, naso-pharyngeal catarrh, tracheo-bronchitis, and pneumonia, or may occur as a part of an acute diffuse inflammation of the whole respiratory tract. Severe cases may lead to oedema and cellulitis of the neck or trachea,⁶⁵ and to laryngeal abscess, with necrosis and exfoliation of cartilage, or they may leave behind them permanent structural changes in the muscular apparatus of the larynx, and in rare instances a chronic laryngitis may date its appearance from an acute catarrh. The disease generally lasts from three to ten days; may become subacute, rarely chronic, except, perhaps, from constitutional causes.

Diagnosis.—If a laryngoscopic examination can be made, there will be no difficulty as to the diagnosis. If this be impossible, careful inquiry into the history of the case, examination of the pharynx and nasal passages, and a full appreciation of the constitutional symptoms, when present, with the physical examination of the neck and thorax, will serve to differentiate the affection from diphtheria, "false croup," and other spasmodic diseases of the larynx. It should be remembered, in this connection, that hoarseness is not laryngitis. The pressure of a thoracic aneurism, hysteria, and certain affections of the cervical cord, give rise to symptoms which resemble those of acute laryngitis, or the disease may be simulated, as in the classical case of Demosthenes.

The *prognosis* will depend upon the age of the patient. Acute laryngitis in the adult is never fatal, except when complicated by oedematous infiltration or hæmorrhage into the submucous tissue. In children the prognosis is less favorable, but good, though the tendency to prolonged spasm, and, in some cases delirium and coma, should not be lost sight of.

Treatment.—The management of acute laryngitis must be regulated by the principles which govern the treatment of acute inflammation in general, with certain modifications which the peculiar physiological properties of the respiratory and vocal organs necessitate.

The patient should be placed in a slightly moist atmosphere ranging from 75° to 80° F., should be made to breathe through the nose, and should keep the vocal organs at rest. If necessary, the bowels should be opened and the transpiratory action of the skin encouraged.

Remedial agents in this disease are constitutional and local. Among the former, the most reliable are quinine and opium. The former should be pushed to cinchonism, and, if taken at the outset, not infrequently aborts the disease or mitigates the severity of its course.* The same is true, in a measure, of the salts of salicylic acid and allied substances. Less efficacious are the prepara-

* In the administration of large doses of quinine and allied drugs due regard should be had to the injurious effects of these agents on the cerebral and aural circulations.

tions of mercury and antimony. The latter, if given at all, should be well diluted to prevent their irritative local influence on the throat (Flint). In order to control the vaso-motor paresis, which is more or less conspicuous in all forms of throat inflammation, resort may be had to the bromides, morphine, belladonna, and allied substances. The tendency to spasm may be lessened by opium and other antispasmodics. Bearing in mind the probable mechanism of the spasm, it is well to thoroughly cleanse the nasal passages and upper pharynx before the child retires for the night. The external application of cold compresses is often of benefit, not only in controlling the inflammatory process, but also in diminishing the tendency to spasm.

Of local remedies, the most rational and efficacious are the vapors of sedative or mildly stimulating substances, such as benzoïn, camphor, hops, eucalyptol, cubebs, juniper, and other essential oils. These may be taken by direct inhalation, or their vapors may be diffused in the air of the apartment. In children the latter method is of especial value, or resort may be had to the "tent."

The topical application as spray of a two per cent. solution of muriate of cocaine, a weak spray of boric acid and bromide of potash in glycerine and water, followed by one of oil of sweet almonds, have been used by the writer with gratifying results. The latter spray should also be used in the nasal passages. Later in the disease, weak astringent solutions may be resorted to, and resolution hastened by the administration of alkaline or sulphur waters. Any constitutional tendency or existing diathetic disease should be carefully sought for, and appropriate treatment adopted to secure immunity from possible permanent weakening or injury of the vocal organs.

Caution should be exercised in the topical application of such drugs as strong solutions of the nitrate of silver (Horace Green). While it is undoubtedly true that the anæsthetic, and perhaps alterative, effect of the latter drug is sometimes of decided benefit, it must nevertheless be remembered that the same, if not better, results may be accomplished by a host of other and simpler measures, and the danger thereby avoided of producing a great deal of possible mischief.

An acutely inflamed larynx should be handled with the utmost delicacy, and should not be invaded by probang, cotton carrier, and mop. The writer regards, too, the insufflation of medicine in solid form (powders) as an unnecessary and injudicious procedure in the acute form of laryngeal inflammation. Heed should also be taken not to subject the larynx to unnecessary treatment and manipulation, to the neglect of coexisting disease of the upper throat and nasal passages.

The question of tracheotomy must be decided on the individual merits of each particular case. As a rule, it is uncalled for. In connection with the operation, two things should be kept in mind: (1) that the tendency of the spasm, however alarming to the uninitiated, is to subside without dangerous consequences, and, on the other hand (2) that, in the presence of increased frequency and prolonged duration of the glottic obstruction, the surgeon should hold himself in readiness to make an artificial opening in the trachea.

SUBACUTE LARYNGITIS.—Subacute laryngitis is a very common affection, whose symptoms are those of a mild form of acute laryngeal catarrh, for which it is often mistaken. It is a common complication of coryza and bronchitis, and is not infrequently the starting-point of chronic laryngeal inflammation.

The laryngoscopic appearances are those of diffuse or localized congestion, with moderate swelling of the mucous membrane and pinkness of the vocal cords. The disease derives its importance from the fact that it is often the precursor of chronic inflammatory affections of the larynx. Bearing this fact in mind, treatment should be begun at once and carried out in accordance with the general principles which regulate the management of simple catarrhal inflammation of the larynx.

CHRONIC LARYNGITIS.—Chronic catarrhal laryngitis, as an isolated affection, is rarely met with. Nearly always

it is associated with chronic inflammatory disease of the nose or naso-pharynx, upon which it, in the large majority of cases, depends. The manner of its development in this case will be pointed out in the article on Nose, Catarrhal Affections of, and its predisposing and exciting causes will, therefore, be found under that head, and in the sections relating to Laryngeal Hyperæmia and Acute Laryngitis.

While it is doubtless true that frequently occurring attacks of acute laryngitis predispose to the disease, it is rarely ushered in by an acute attack, except under particularly unfavorable circumstances, such as the presence in the individual of some constitutional vice, or the persistent neglect of hygienic and remedial measures. Much more frequently it is the result of a neglected subacute inflammation, or is essentially chronic from the first.

Pathological Anatomy.—Upon post-mortem examination, the mucous membrane of the larynx presents a dark or yellowish-red appearance, pigmented in places; its vessels are enlarged and tortuous, and here and there the remains of capillary hæmorrhages can be seen. It is covered with a more or less muco-purulent exudation, which consists mainly of lymphoid corpuscles and degenerated epithelium. The vessels of the mucosa and submucosa are increased in number and perceptibly enlarged in calibre, and surrounded by a round-cell infiltration. The epithelial layer presents a marked increase in volume, due to an abundant proliferation of its elements. Here and there the epithelium is wanting, or is replaced by a granular or fatty detritus. At the places where the epithelium is more or less intact or undergoing commencing degeneration, the individual cells are surrounded or crowded apart by lymphoid corpuscles. In some cases the papillæ are hypertrophied, and the glands show an increase in volume with desquamation of their epithelium.

There is always more or less hyperplasia of the submucous tissue, which is especially well marked in the hypertrophic form of the disease. The latter is probably more common than is generally supposed, and histological examination discloses more or less hypertrophy of the mucous membrane, in all its layers, in most cases of long-standing catarrhal laryngitis. It is also probable that atrophy of the membrane may occur as a sequel to the hypertrophic form, although this is a question which will have to be determined by future research.

In the so-called "trachoma" of the cords, the histological changes are essentially those of hypertrophy of the different layers of the mucous membrane. In the same category may be placed, too, that form, or rather sequel, of chronic laryngitis first described by Rokitsansky,⁶⁶ and to which Gerhardt⁶⁷ has given the ponderous title of *choroiditis vocalis inferior hypertrophica*. The pathological nature of the latter condition, which, as its name implies, occurs most frequently in the subglottic region, has given rise to much discussion. It is characterized by an indurated, tumor-like hypertrophy of the subglottic tissues, with occasional implication of the cartilages and perichondrium,⁶⁸ which, in some cases, reaches such a grade as to necessitate tracheotomy.⁶⁹ This peculiar indurated hypertrophy of the larynx may owe its origin to a number of pathological states, of which the fibroid degeneration of syphilis, perhaps, forms a not inconspicuous percentage (*vide* article on Syphilis of the Larynx).

Virchow⁷⁰ has described as a sequel to chronic laryngitis, occurring especially in chronic alcoholismus, a veritable pachydermatous condition of the vocal cords and adjacent structures, whose starting-point is usually the vocal processes.

In the chronic laryngitis which results from obstructed circulation, the epithelial layer, according to Eppinger,⁷¹ presents simply a slight exfoliation of the epithelium without cell proliferation, and a thickening or condensation of the connective tissue which proceeds from the adventitia of the dilated blood-vessels. Beneath the basement membrane is an aggregation of lymphoid cells, which is especially pronounced between the acini of the conglomerate glands. Particularly well marked is the looseness of the submucous connective tissue. In this

form of laryngitis the secretion is frothy, serous, and contains fewer lymphoid cells.⁷²

Symptoms.—The loss of function produced by chronic laryngitis will vary with the extent and character of the inflammation, and with the physiological importance of the structures involved. The symptoms therefore present all grades of local functional impairment, from a slight huskiness of the voice and uneasy sensations in the throat to serious interference with both the inspiratory and expiratory forces of respiration.

Chronic laryngitis is, as a rule, insidious in its development, and the membrane may be affected long before the sensations of the patient lead him to suspect the existence of disease of the vocal organ. Its phenomena are usually preceded by the symptoms of chronic inflammation of the nasal passages and pharynx, and are intensified by those of the accompanying catarrhal naso-pharyngeal affection.

In singers and in all who make a professional use of the voice, the interference with vocalization leads to an earlier detection of the malady. In them it asserts itself in fatigue of the voice after moderate exertion, either as loss of tension, tendency to unnatural hoarseness after singing, or some other form of vocal disability. Great singers rarely suffer from the disease, nor do those in general whose voices have been trained by correct methods of culture, the proper and systematic use of the voice being one of the best prophylactics against inflammatory conditions of the larynx. This fatigue of the voice is due, in a large proportion of cases, to insufficiency of the vocal forces, brought about in the first instance by an unnatural attempt to overcome by abnormal contraction of the expiratory muscles the loss of power and function resulting from naso-pharyngeal disease. The congested condition and increased secretion of the larynx thus brought about are manifested at first by indefinite sensations in the throat with a tendency to cough, and hoarseness on arising in the morning or after the continuous use of the voice, or indulgence in wines, tobacco, and stimulating articles of food.

These symptoms become gradually more severe; there is a more or less constant sensation of a foreign body in the throat, which gives rise to a short, harassing cough, and efforts of hawking to remove it. The throat becomes dry, and at night a sense of constriction is complained of which sometimes causes the patient to start from his sleep.

The secretion is, as a rule, scanty, and gives rise to little trouble during the day; but at night accumulates in the larynx and is coughed up in the morning as pellets of more or less tenacious and discolored mucus. It is occasionally streaked with blood.

The changes in the voice present infinite gradations in impairment, from very slight hoarseness to a harsh, raucous or metallic sound, or, in long-standing cases, complete aphonia.

In a mild case of laryngitis, the voice becomes husky only from some unusual exertion, exposure, excesses, emotional excitement, or at some physiological period, as that of menstruation, and returns apparently to the normal when the exciting cause is removed. Very extensive inflammation of the mucous membrane of the larynx is compatible with freedom from hoarseness, provided the vocal cords be not included in the inflammatory process.

Deglutition is never interfered with to any extent, but disagreeable sensations in swallowing are not infrequently complained of. Respiration is rarely affected, except when the thickening is extensive and sufficient to diminish considerably the lumen of the larynx.

There are a number of symptoms referable to impairment of the muscular apparatus of the larynx, which will be discussed under the heading *Neuroses of the Larynx* (in the Appendix) which are the expression of inflammatory infiltration of the muscle-substance, or even fatty degeneration of the same.

In some persons—generally in those of a hypersensitive or nervous organization, although by no means limited to this class—various phenomena, referable to reflex action, show themselves in other organs remote from the seat of disease, whose dependence upon the laryngeal af-

fection must be inferred from their disappearance or mitigation with the cure of the latter.

These consist in neuralgic conditions in the path of the nerves which radiate from the laryngeal plexus, and find their expression in so-called rheumatic pains in the regions which receive the terminal distribution of their fibres.

Various paroxysmal affections, such as asthma, violent cough, spasmodic affections of the cords, etc., are also traceable to chronic laryngeal irritation or inflammation.

The *laryngoscopic picture* of chronic laryngitis presents a great variety of pathological appearances. The mucous membrane may be affected as a whole, or the inflammatory process may be limited to individual portions. Some of the older writers, accordingly, speak of chronic epiglottitis, chondritis, etc., but this is obviously an unnecessary refinement of specialism, and tends to introduce confusion in the clinical study of the disease.

It is often difficult to determine exactly where inflammation commences and where chronic hyperæmia ends. The first stage of the former is essentially a condition of hyperæmia, the inflammatory process being recognized by the practised eye by slight swelling and puffiness of the mucous membrane.

The redness may be diffuse or limited to the aryepiglottic folds, the arytenoid cartilages, the ventricular bands, etc., and, in rare instances, to the vocal cords. The vessels of the epiglottis are often enlarged, tortuous, and, in exceptional cases, varicose. In old people the varicose condition is sometimes especially well marked. In the laryngitis of habitual drinkers the redness is very pronounced, and often assumes an angry look, which, if associated with hypersensitiveness of the mucous membrane, is somewhat characteristic. Occasionally, small capillary hæmorrhages can be detected in different portions of the larynx.

A frequent seat of congestion is the vocal process and the posterior third of the vocal cords. The cords themselves vary in color from a pale, dull, lustreless pink to a pronounced reddish hue. The vessels are often enlarged, presenting the appearance of fine linear streaks running parallel with the long axis of the cord. In long-standing cases the coloration of the membrane is not always so pronounced, and the interior of the larynx presents a reddish-yellow color, as if the cartilage could be seen shining beneath it.

In old cases of laryngitis the mucous membrane presents a thinned, pale, lustreless, grayish-red color, with a perceptible diminution in thickness, which doubtless represents a condition of commencing atrophy.

Thickening of the mucous membrane occurs either as a uniformly smooth, diffuse, or circumscribed swelling, or as a rough, uneven, almost nodular condition, due to enlargement of the papillæ and glands, which has led to the creation of the terms glandular laryngitis or granular hypertrophy of the larynx. It is generally associated with corresponding changes in the pharynx, and seems to depend upon the same causes which lead to the latter disease.

Infiltration of the vocal cords appears either as a well-marked rounded swelling of their upper surface, or as an uneven condition of their free edges, which may be mistaken by the uninitiated for loss of substance. Sometimes the surfaces of the true and false vocal cords present a peculiar granular appearance, due to the aggregation of nodules of varying size, which consist of hyperplasia of the epithelium, *plus* an hypertrophy of the submucous tissue.⁷³ This condition is described by Tuerck under the title *chondritis tuberosa*, or trachoma of the vocal cords, from its resemblance to trachoma of the conjunctiva. We have met with this condition only in hospital practice and among the badly nourished, and invariably upon the vocal cords. A similar trachomatous condition of the interarytenoid fold has been described by Stoerck,⁷⁴ as occurring in stout persons after exhausting diseases, or in women after labor, as the result of constant coughing and hawking from dryness of the arytenoid fold, due to suppressed or diminished secretion.

In some cases of chronic laryngitis from any cause, simple, syphilitic, or tubercular, small cysts are occasionally seen on the vocal cords, generally posteriorly, on the laryngeal surface of the epiglottis and in the ventricles, which result from the changes in the glands in the granular form of the disease.

Superficial erosions, which occur most frequently on the vocal cords and in the interarytenoid fold, are not uncommonly met with, and are due to purely mechanical causes. Stoerck⁷⁵ describes at great length, under the title "Fissura Mucosa," a fissured condition of the interarytenoid fold which is prevented from healing by the constant separation of its edges by the muscular motions of the posterior laryngeal wall.

It is extremely doubtful whether true ulceration ever occurs as a complication or result of simple laryngitis.

In a certain proportion of cases—more often, perhaps, than is generally supposed—a true hypertrophy of the laryngeal membrane, as a whole, is met with, which, in some rare instances, is so great as to diminish considerably the lumen of the larynx. Diffuse hypertrophy is doubtless rare, but it is not uncommon to find nodular or poly-poid excrescences which may be regarded as localized hypertrophies.

In very rare instances a condition of the mucous membrane of the larynx is found which, from its resemblance to an analogous condition of the nasal passages, has received the name *ozena laryngis*.⁷⁶ As in the nasal affection, this is characterized by the formation of crusts and the development of excessive fœtor. The crusts adhere to the atrophied membrane with great tenacity, and leave eroded surfaces upon their separation. The condition is analogous to the chronic blennorrhœa of the mucous membrane, said by Stoerck to be common to the inhabitants of Poland, Galicia, and Bessarabia.

Diagnosis.—There should be no difficulty in the laryngoscopic recognition of chronic laryngitis. The hypertrophic form may be confounded with the fibroid degeneration of syphilis (see article on Syphilis of the Larynx), but in the latter case the history and objective evidences of pre-existing syphilitic lesions in the pharynx and other organs of the body will put the diagnosis beyond a doubt. For its differentiation from the laryngitis of secondary syphilis, the article on Syphilis of the Larynx should be consulted. It may be laid down as a diagnostic maxim that ulceration of the laryngeal membrane, except when due to mechanical or chemical causes, is nearly always the expression of some constitutional morbid state, either inherited or acquired. The existence, therefore, of laryngeal ulceration should lead to the careful examination of the patient and his antecedents, and to a guarded prognosis on the part of his medical adviser. The presence of ulcers is the most reliable test in the separation of chronic catarrhal inflammation from the early laryngitis of tuberculosis, that is, at the stage when the peculiar infiltration of the latter disease has not become so pronounced (see article on Larynx, Phthisis of the).

Prognosis.—In simple chronic laryngitis the prognosis is good, provided its treatment be carried out in accordance with the fundamental principles indicated below. Where pronounced thickening of the tissues has occurred the prognosis is less favorable, and in trachoma of the cords and the advanced hypertrophic form, decidedly bad. The destruction of function produced by atrophic laryngitis is, of course, irremediable, but great relief may be afforded by the measures recommended under the head of atrophic rhinitis. The prognosis will, furthermore, vary with the course of the disease and its duration, and a host of other influences which modify the course of catarrhal inflammations in general.

Recovery from chronic laryngitis may be permanent, or, as not infrequently happens, the individual may be predisposed thereafter to attacks of acute and subacute inflammation.

Catarrhal inflammation of the larynx occasionally disappears completely and permanently during the course of an acute febrile disease (see also article on Nose, Catarrhal Affections of).

Complications and Sequels.—Besides those already men-

tioned, the disease may lead to chronic inflammation of the trachea and bronchi, or to irritative (congestive) conditions of adjacent organs, as the œsophagus, stomach, and thyroid gland. It may also form the connecting link between a number of so-called rheumatic or neurotic conditions in various parts of the body, or awaken the predisposition to the local expression of constitutional vices or diseases. Whether a simple inflammation of the larynx, *per se*, without the previous existence of constitutional taint, may determine the eruption of diathetic diseases, as, for example, tuberculosis in the laryngo-tracheal structures, is a question which, in the present state of medical knowledge, must be answered in the negative.

Interference with the normal excursions of the vocal cords is not infrequently observed, and probably depends upon inflammatory infiltration of the intrinsic muscles. This may lead to a simple paresis, or, in long-standing cases, the interstitial infiltration may undergo metamorphosis and fatty degeneration of the muscular substance ensue, with consequent atrophy. Pronounced œdema is uncommon, and perichondritis is rarely, if ever, a sequel of simple laryngitis.

A rare complication of chronic laryngeal inflammation is eversion or prolapse of the ventricles, cases of which have been recorded by Moxon,⁷⁷ Morell Mackenzie,⁷⁸ Lef-ferts,⁷⁹ Waldenburg,⁸⁰ Cohen,⁸¹ Elsberg,⁸² the writer,⁸³ J. D. Arnold,⁸⁴ and Major.⁸⁵ The etiology of this accident is obscure, and the imperfect data which the literature of the subject affords render it difficult to arrive at any definite conclusions regarding its precise pathological significance. It is possible that it may be due to a variety of causes. A remarkable feature of most of the recorded cases is that the prolapse occurred in persons suffering from chronic catarrh and relaxation of the mucous membrane of the respiratory passages, and it is therefore not improbable that an important predisposing cause of the condition may reside in chronic inflammatory disease of the ventricles themselves. Inflammation leads to eversion by causing relaxation of the ventricular supports. If long continued, it may lead to infiltration and fatty degeneration, and finally induce a paralytic state of the muscular walls of the sac; and it is not difficult to understand how such a condition may eventually lead to abrogation of the suspensory function of the internal superior fibrous ligament of the sac. In chronic inflammatory disease of the ventricle, descent of the latter may be furthermore facilitated by hyperplasia of the periventricular areolar tissue, which thus, acting as a *vis a tergo*, may push the walls of the sac downward toward the cavity of the larynx. When the inferior segment of the pouch engages in the constricted portion which separates the two ventricular divisions, or, in other words, when inversion is complete, strangulation takes place, vascular dilatation supervenes, and the sacculus presents itself at the glottis as a protuberant mass, covered externally by its thickened, congested mucous membrane, and consisting internally of its connective-tissue bed in a state of inflammatory proliferation.

A sudden loss of voice, therefore, with more or less stridor in inspiration after violent expiratory efforts, or occurring without assignable cause in a person suffering from chronic catarrhal affections of the respiratory mucous membrane, would suggest the possibility of ventricular prolapse; but the diagnosis can only be made with the laryngoscope. Here the prolapsed ventricle may be confounded with fibrous polypus. If the case be seen before strangulation of the mass takes place, and when the sacculus presents itself at the glottis as a thickened fold, the diagnosis may be made by the rolling inward in phonation and disappearance within the ventricular orifice of the prolapsed sac, as described by Lef-ferts and Elsberg; or it may be returned within the orifice by means of a suitably bent probe. If, however, the dislocated ventricle has become strangulated and converted into a mass of inflammatory tissue, its differentiation from fibrous polypus may be aided by attention to its immobility, its attachment in its entire length to the ventricular band, the negative results of forced respiratory acts, its more or less

pear-shape, with the long axis parallel with the ventricular band and vocal cord, and its smaller end in front. The retraction of the mass within the ventricular orifice under astringent applications strongly favors, if it does not absolutely confirm, its inflammatory nature; and if the mass be bilateral, polypus may be safely excluded. The rules which regulate the surgeon in the removal of laryngeal growths in general are equally applicable here. If forceps be used, care should be exercised lest the ventricle be torn too forcibly from its insertion. It should be remembered, too, that retraction of the sacculus within the ventricular orifice may be sometimes secured by the persistent direct application of astringents.

Treatment.—The treatment of chronic laryngitis is prophylactic and curative. The former consists in the adoption of the precautionary measures discussed in the sections on *Nasal* and *Pharyngeal Inflammation*, and the successful remedial treatment will depend upon the recognition and removal of the predisposing and exciting causes of the disease.

In carrying out both prophylactic and curative measures, it should be forever borne in mind that chronic inflammation of the larynx is rarely a primary affection; that in the vast majority of instances it is secondary to, or symptomatic of, a diseased condition of the nasal and naso-pharyngeal cavities; and that its proper management will often depend more upon the intelligent appreciation of associated, though remote, pathological processes than upon the routine treatment with which the larynx is too frequently assailed. In addition, therefore, to local applications, attention should be given to the general health, and the different organs of the body and their functions should be systematically interrogated. While too much stress should not be placed upon constitutional medication, the adoption or rejection of the latter is often sufficient to turn the balance in favor of success or failure, and in all cases local treatment is assisted by the stimulation of the nutritive processes by a judicious tonic regimen.

In simple chronic laryngitis, the local treatment consists in the topical application of astringent, stimulant, and alterative preparations to the laryngeal mucous membrane, either in the form of vapor and spray, or by means of cotton carriers, brushes, etc. The physician should commence with weak solutions and gradually increase the quantity of the medicament until the maximum strength is reached from which the patient suffers no lasting inconvenience. The substances most commonly employed are the salts of zinc (chloride and sulphate), iron (sesquichloride, sulphate, ammonio-ferric alum), the nitrate of silver, iodine, and the iodides (sodium, potassium, and ammonium), carbolic and boracic acids, and bichloride of mercury. In cases which have resisted ordinary measures, and are accompanied with profuse secretion, the writer has used a weak solution of the dioxide of hydrogen, combining the local application with the internal administration of the remedy in doses of half an ounce of a four per cent. solution, three or four times a day.

The process of inhalation may be most conveniently carried out by the use of the various forms of inhaling apparatus in common use, or those which work by the compressed air, or water power, as used by American specialists; or the substance may be volatilized in the air of the patient's apartment; or, for those who can afford it, temporary residence in an atmosphere impregnated with balsamic odors furnishes the most excellent method of inhalation. It may be said, in general, that cold inhalations are more efficacious than hot, and are not open to the (same) objections which the use of the latter involves.

The application of remedies in solid form (powders) to the larynx often does more harm than good, from the irritation which they produce, and tends to increase rather than to dissipate the inflammatory symptoms. If medicine in solid form is to be employed, it should be applied in some such vehicle as cosmoline, vaseline, etc. This may be used with the cotton carrier, or liquefied for use in spray.

Where moderate thickening exists, much advantage may be derived from applications of the yellow or red

oxide of mercury. When there is decided thickening destructive measures are to be used (cautery, acids, etc.).

The granular or trachomatous condition is best treated with the galvano-cautery, or by the local application of absolute alcohol or chromic acid.

The use of the various sulphur, alkaline, and alum waters, preferably at their sources, is often of decided benefit in the treatment of chronic laryngitis. Mineral waters should not, however, be used indiscriminately, nor for too great a length of time. General tonics, and especially those which act upon that portion of the nervous system which regulates the contraction and dilatation of the blood-vessels, are often indicated, particularly in cases of long duration.

The hygiene of the naso-laryngeal tract is coextensive with that of the general organism, and the hygienic management of catarrhal affections must be, therefore, governed by the laws and principles of health. It is impossible to lay too much stress upon the hygienic treatment of these affections, for it is often the key to their successful management. This is a proposition which is often on the tongue but seldom in the mind, and the fact is too often lost sight of, that nothing militates so much against the success of local treatment as the improper hygienic surroundings of the patient.

It sometimes happens that, despite judicious local and general treatment, the inflammatory process shows little or no disposition to subside, and in this event change of residence offers the surest hope of relief to those whose means and convenience will permit them to move to a more suitable climate. The general rules governing the selection of a place of residence must be deduced from what has already been laid down in treating of the geographical distribution of catarrhal affections. Patients generally do better in a moderately high and cold region, where the atmosphere is bracing, equable, and pure, and the temperature and humidity of the air do not vary greatly before and after nightfall. Many mountain resorts are, for example, rendered unfit for the relief of catarrhal affections by the sudden dampness and chilliness which follow the setting of the sun. A very warm climate is not, as a rule, desirable in cases of simple catarrhal inflammation, the depressing effect of the heat upon the nervous apparatus often more than counterbalancing the good results produced by change of scene and air. Individuals are variously affected by the air of the ocean. A sea voyage, or residence at the sea-shore, is, in the large majority of instances, productive of good, and the effects of surf-bathing are often magical. In some persons, on the other hand, the respiratory mucous membrane seems to resent the presence of the salt air, but these are the exceptions to the general rule.

EDEMA AND ABSCESS OF THE LARYNX.—From a strictly pathological standpoint, abscess of the larynx should be considered under the head of acute laryngitis, and the same is likewise true of laryngeal edema, except, perhaps, when occurring as the pathological analogue of other infiltrations into the serous, submucous, or subcutaneous tissue. Neither is a distinct disease *per se*, but is always found as the complication or result of local or systemic conditions—as the symptomatic expression of some internal, and it may be imperfectly understood, morbid process. In the following articles we shall therefore look upon them, not as distinct diseases, but as complications which, in view of their tendency to fatal result, merit the right of separate and special consideration.

Historical.—That the ancients recognized a form of laryngeal angina which killed by suddenly closing the windpipe, is beyond a doubt, but their recorded observations render it questionable whether edema and suppuration were familiar to them as complications of the severe type of catarrhal inflammation of the larynx. While, then, it is probable that the fathers of medicine confounded edema and abscess of the larynx with various spasmodic affections of the air-passages and suppuration in the pulmonary parenchyma (see especially Aretæus), the testimony of certain of the earlier poets and historians would seem to lead inferentially to the conclusion that

the danger of sudden death from constriction of the larynx in simple quinsy (*angina*) was a matter of popular recognition. Thus Plautus, in the "Mostellaria," makes Philo utter the wish that he be transformed into the quinsy, to seize the throat of the old wretch and put an end to the wicked mischief-maker:

In anginam ego nunc me velim verti, ut venesicō illi,
Fauces prehendam et enecem scelestam stimulatricem.
Plautus, Most., Act. i., Sc. iii., v. 61, seq.

And we are informed by Festus⁸⁶ that those who were suffocated by drink were said to have the *angina vinaria*. Pliny⁸⁷ hints at strangling as an effect of quinsy; Livy⁸⁸ tells of an angina which threatened suffocation; and finally, the Romans had a goddess, Angerona, whose aid they invoked in cases of suffocative throat affections.

It is probable, however, that the ancient physicians confounded these affections with analogous conditions of the pharynx.* Although it is quite possible that the so-called hydatid tumors of the larynx described by the older writers, and found in the ephemeral productions of several centuries ago, were in reality none other than cases of oedematous infiltration; and although Boerhaave,⁸⁹ and later Van Swieten,⁹⁰ had distinctly announced the frequent implication of the larynx in a disease whose pathological nature was subsequently brought to light by the scalpel of Morgagni,⁹¹ and elucidated by the genius that directed it, the attention of the scientific world was first prominently called to the importance of the subject by the publications of Bayle† and Thuillier.⁹² Inspired by their researches, the study of the disease was taken up by a number of their countrymen, of whom may be specially mentioned Bouillard,⁹³ Lisfranc,⁹⁴ and Cruveilhier,⁹⁵ while much light was thrown upon the treatment of the affection by Gurdon Buck⁹⁶ and Bartlett,⁹⁷ in this country; and upon the host of observations, theses, essays, etc., which followed the publications of these writers, was founded the classical *mémoire* of Sestier.⁹⁸

ABSCESS OF THE LARYNX.—Etiology.—An acute idiopathic, circumscribed, purulent infiltration of the tissues of the larynx is one of the rarest of diseases. Such a condition, when present, is usually preceded by, or occurs in the course of, a violent laryngeal inflammation. Collections of pus, in this situation, whether circumscribed or diffuse, are in the majority of cases directly traceable to a local or systemic infection, or complicate existing malignant disease of the organ. They occur, for example, as metastatic phenomena in the various forms of septicæmia, as complications of the exanthemata, typhus and typhoid fever, diphtheria, erysipelas, and glanders, or as the result of chondritis and perichondritis from tuberculosis, syphilis, and cancer. Purulent formations occasionally develop in the neighborhood of ulcers of the larynx, or from external or internal violence to its structures, as in wounds and fractures, and from the presence of foreign bodies in its interior. Suppuration also occurs sometimes as a termination of the laryngitis which results from scalds and burns, or from the injury done to a contiguous organ. In a case observed by the writer, the abscess followed the transfixion of the left arytenoid cartilage by a fish-bone, which had become impacted in the œsophagus.⁹⁹

Pathology.—The affection is characterized anatomically by the presence of a purulent or sanguino-purulent exudation into the submucous connective tissue. As in laryngeal oedema, these collections of pus are usually limited to those portions of the larynx which are especially rich in loose areolar tissue, diffuse suppuration being very rarely met with. The abscess is usually single,

or becomes so from the coalescence of small, multiple, submucous centres of purulent infiltration. There is almost always a certain amount of accompanying laryngeal oedema, which may be so great as to mask the original affection. Occasionally the glandular apparatus of the larynx is the part principally involved, and small follicular abscesses result which may be with propriety classed under this head.

Symptoms and Diagnosis.—There are no symptoms which are characteristic of laryngeal abscess, and the diagnosis can therefore be only made with certainty with the laryngoscope. Even with its aid, the affection is often only to be differentiated by the closest inquiry into the history of the case. When perichondritis coexists with abscess, it is often exceedingly difficult to say which is the primary disease. The accompanying oedema which is so often present, together with the close resemblance of the purulent swelling to that of ordinary oedema, still further interferes with certain diagnosis. The distinctly circumscribed character of the swelling, a discolored condition of the mucous membrane covering it (commencing necrosis), or the presence of pus beneath it, indicated by a peculiar yellowish refraction, and especially the latter, are strongly suggestive of the disease; but the point can, in many cases, be only definitely settled by the use of the laryngeal lancet. This procedure will not only facilitate the diagnosis, but, in either event, will accomplish the desired curative result.

Complications, Course, and Sequels.—While absorption of the exudation is, of course, possible, it is highly probable that this rarely, if ever, occurs. Usually there is a rapidly progressive formation of pus, which, if it does not in the meantime lead to death by suffocation, is discharged spontaneously. The latter is accomplished by rupture of the abscess into the larynx* or pharynx, or by its perforation through the walls of the œsophagus. Occasionally it burrows to the base of the tongue, to the cartilages, producing a suppurative perichondritis, or finally finds an exit by invading the cellular tissues of the neck.

The pus is discharged by sloughing of the mucous membrane, from which an ulcer usually results, which under favorable circumstances cicatrizes, but which often, especially when due to blood-poisoning, becomes phagedenic. The contraction of the larynx in the cicatrization of the larger ulcers is sometimes so great as to produce decided laryngeal obstruction. In other cases, when the purulent infiltration is diffuse, chronic thickening of the submucous tissues results, with diminution in the calibre of the larynx.

The *prognosis* in simple abscess, uncomplicated by any systemic infection, and when burrowing has not occurred, is good, provided the pus can be evacuated. When extensive undermining of the tissues with sloughing occurs, death generally ensues, or chronic disease of the laryngeal structures results, with perichondritis, thickening, stenosis, fistulæ, etc. When discharged spontaneously, the pus is generally coughed up; but a case is recorded in which death resulted from its entrance into the trachea.¹⁰⁰ Relapses of pus-formation in the larynx now and then occur.

Treatment should be carried out on general surgical principles. If possible, the abscess should be opened at once, and the expulsion of the pus by the mouth facilitated by bowing the head of the patient downward and forward. If asphyxia threatens from accompanying oedema, tracheotomy should be performed.

ŒDEMA OF THE LARYNX.—Œdema of the larynx may be acute or chronic. Acute oedema may be primary or secondary. Acute oedematous infiltration of the laryngeal structures is a comparatively rare affection, while chronic oedema is common to a number of different pathological states.

The *etiology* of acute idiopathic or primary oedema is obscure; but the vast majority of these cases are to be traced to some constitutional vice, systemic infection,

* Albers states that Roland, of Parma, centuries ago, opened a laryngeal abscess with the knife, but it is not stated whether the abscess pointed within the larynx, or externally in the neck. Albers, in introduction to his *Path. u. Therapie der Kehlkopfkrankheiten*, Leipzig, 1829.

† Bayle first brought the subject before the Société de l'Ecole de Médecine of Paris in August, 1808, but his first published account appeared in the *Dict. des Sciences Médicales*, art. Œdème de la glotte, 1817. (See also his *Mémoire sur l'œdème de la glotte, ou l'angine laryngo-œdémateuse*, Paris, 1819.) In the interval which elapsed between the communication of Bayle and its publication, appeared the important essay by Thuillier, which cast much light upon the pathology, diagnosis, and treatment of the affection.

* In a case recorded by Döring (*Zeitschrift von Henle u. Pfeuffer*, quoted by Rühle, *Die Kehlkopfkrankheiten*, Berlin, 1861, S. 166), sudden death resulted from the rupture of an abscess in this situation.

or obstructive anomalies of the circulation from organic lesions of other organs. Acute œdema of the larynx occurs most frequently perhaps during the course of acute laryngeal catarrh. It also is present as a secondary phenomenon in the laryngeal affections of diphtheria, in the exanthemata, in syphilis, cancer, tuberculosis, erysipelas, glanders, scurvy, purpura, and allied affections, in obstructive disease of the lungs, and in abscess, chondritis, and perichondritis of the larynx; or as a complication of the acute inflammation of the latter induced by burns, scalds, foreign bodies, wounds, fractures, and other surgical injuries.

Acute œdema of the larynx occurs in the course of organic diseases productive of dropsical conditions in various portions of the body. Its occurrence as a frequent complication of Bright's disease is affirmed by some and strenuously denied by others. As Flint¹⁰¹ has justly remarked, however, it is important to bear in mind the fact that it may occur as the first and only dropsical condition connected with renal disease. It may complicate acute inflammation of adjacent structures, as the thyroid, cervical, and parotid glands, and even the tonsils, and may develop during the course of cervical erysipelas and cellulitis.

It has been known to occur during whooping-cough, suppurative disease of the liver, poisoning by certain drugs, as iodine and mercury, and during convalescence from the essential fevers.

Laryngeal œdema takes place sometimes as the result of extension from contiguous structures, as the pharynx, tonsils, mouth, œsophagus, mediastinum, neck, etc. Contiguity of structure, however, by no means implies the probable extension of the inflammatory process, for œdema of the pharynx comparatively rarely terminates in serous infiltration of the laryngeal structures. The exudation here may be brought about by direct extension of the morbid process, or it may occur as a collateral phenomenon—the collateral œdema of Virchow.

Chronic œdema occurs as an accompaniment of almost every affection attended by general dropsy; from obstructed circulation, organic or mechanical, in the vascular and lymph-channels of the neck, chest, and abdomen, and in chronic laryngeal disease, especially in the neighborhood of cancerous, phthisical, and syphilitic ulceration.

œdema of the larynx is more commonly met with among men than among women; in adults it occurs more frequently than in children, from the anatomical fact that the greater laxity and abundance of the connective tissue in the former favors the exudation of serum. Other things being equal, it is more liable to occur in those whose powers have been enfeebled by disease or excesses than in the healthy and robust.

The œdematous swelling, which is usually confined to that portion of the larynx above the vocal cords, is generally bilateral, but may be confined to one side. It is most commonly seen as an infiltration of the aryepiglottic folds or epiglottis.

Some writers speak of a subglottic œdema, but it is doubtful whether such a condition ever occurs as a primary affection.

Pathological Anatomy.—The macroscopic appearances of the swellings in the cadaver often differ materially from those observed during life. They are generally more or less collapsed, the diminution in size being due to the wealth of elastic tissue in the larynx and the evacuation of their contents by its post-mortem contraction. This gives the overlying mucous membrane a more or less wrinkled appearance at the situations where œdema has occurred. When the swellings are incised, a serous or sero-purulent fluid exudes, which is often tinged with blood, or contains a more or less copious quantity of lymphoid cells (pus-corpuscles).

The exudation in chronic œdema is much clearer, and contains, according to Eppinger,¹⁰² masses of fat and albuminoid granules.

The histological appearances consist in distention of the muscles and of the areolar tissue by the exudation, which in acute œdema leads to compression of the glands and

great tension of the mucous surface. In chronic œdema, on the other hand, the glands are dilated by the transudation, and their epithelium is found in a state of desquamation.

Symptoms.—The transudation may take place suddenly, a fatal issue supervening within a few moments; or its approach may be insidious, with gradual obstruction to respiration. The central symptom is dyspnoea. This is at first more or less paroxysmal, is most likely to occur at night, and is chiefly limited to the act of inspiration. During the paroxysm, there is a feeling of impending suffocation, as from a foreign body, and a degree of anxiety and terror is produced which is quite characteristic. Inspiration is laborious, stridulous, and often arrested before the full accomplishment of the act. Expiration is at first free and noiseless; but later, when the œdema extends deeper into the larynx, both acts of respiration are interfered with, cyanosis supervenes, the pulse becomes small, feeble, and accelerated, the eyeballs protrude, orthopnoea is present, and coma and delirium ensue.

The voice is not affected, unless laryngitis be present; there is no tenderness on pressure over the larynx, and the symptoms of respiratory distress are not relieved by digital manipulation of the organ.

Cough and expectoration, if present, are not well marked, and the amount of dysphagia varies greatly according to the size and position of the œdematous tumors.

When œdema is secondary its symptoms are, of course, associated with those of the conditions which it complicates.

In chronic œdema the symptoms come on gradually, and the patient only becomes aware of the existence of laryngeal obstruction by the occurrence of dyspnoea on exertion, or by the accession of sudden suffocative paroxysms.

Diagnosis.—In some cases the œdematous swellings can be seen by depressing the tongue, or provoking retching. Should they not become visible by these methods, the finger may be carefully introduced, as originally suggested by Thuillier, into the larynx, and the smooth, hard, globular character of the swellings made out. It should be remembered, however, that by this method dangerous spasm may be brought about, as happened in the oft-quoted case of Trousseau.¹⁰³

The nature of the disease will be at once apparent, however, upon laryngoscopic examination.

œdema of the epiglottis appears as a more or less translucent, turban-shaped swelling, of smooth contour and pinkish or yellowish-red color, which varies in size, and occasionally, as Cohen¹⁰⁴ has pointed out, presents the appearance of two bladders instead of one, from constriction of its central portion by the glosso-epiglottic ligament.

The swellings of the aryepiglottic folds are pyriform or egg-shaped. They meet occasionally in the middle line and obliterate the view of the lower segments of the larynx.

Subglottic œdema appears as two rounded, translucent, bladder-like tumors below, and apparently springing from the under-surface of the vocal cords.

When laryngoscopic examination is not possible, the peculiar inspiratory distress, the absence of hoarseness, and the failure to relieve the dyspnoea by digital manipulation of the larynx, are of great value in the differentiation of œdema from affections which may simulate it.

Prognosis, Course, and Sequels.—The prognosis in acute œdema is decidedly unfavorable. In those cases where effusion takes place suddenly, and especially as a secondary phenomenon, death is almost always the result. The prognosis will furthermore depend upon the conditions under which the œdema develops. When it occurs, for example, as the result of acute blood-poisoning, as in small-pox and typhoid fever, in cervical cellulitis and erysipelas, or in serious organic disease of neighboring parts, the result is decidedly unfavorable.

When the infiltration is limited to a small portion of the larynx, or follows an inflammatory condition of the pharynx, the prognosis is more favorable. The course and sequels of chronic œdema will obviously

depend upon the causes which produce it. In this form the principal danger lies in the liability to sudden accessions of the acute form of the disease.

Treatment.—In some cases the swelling may be reduced by local depletion, counter-irritation, the external and internal administration of ice, or soothing and astringent inhalations. Failing in these, or when the symptoms are urgent from the outset, no time should be lost before scarifying the oedematous portions. This is most satisfactorily accomplished with the laryngeal lancet, or a curved bistoury covered with adhesive plaster to within a third or a quarter of an inch from its distal extremity, and guided by the index-finger of the opposite hand, may be used to scarify the parts, as successfully accomplished by Gurdon Buck. (See under Glottis, Oedema of.) After scarification, the head of the patient should be so placed as to encourage the flow of liquid into the pharynx and mouth. Should scarification not afford relief, and symptoms of asphyxia threaten, resort must be had at once to tracheotomy.

ACUTE AND CHRONIC CATARRHAL TRACHEITIS.—Apart from the inflammation arising from local or mechanical causes (irritation of tracheotomy tube-wounds, etc.), acute and chronic inflammations of the trachea, rarely, if ever, occur as isolated affections. Usually they are met with in connection with disease of the larynx, bronchi, or œsophagus, or as a part of a diffuse inflammatory condition of the upper respiratory tract.

Pathological Anatomy.—In the tracheitis which results from a simple catarrhal process, the anatomical appearances are similar to those found in the larynx, and consist in diffuse or localized hyperæmia, moderate swelling of the mucous membrane, and enlargement of its glandular elements.

When the trachea is opened, a small quantity of glairy, more or less tenacious, muco-purulent secretion is found in the most dependent portions on the posterior wall. Upon removing this, the latter is found dark and congested, and covered with minute whitish or pinkish nodules, which represent swollen glands with their dilated ducts. On pressure with the finger, a small quantity of secretion exudes, which varies in consistency from that of a fluid to something of a more solid nature (cheesy nodules).

The color of the mucous membrane varies greatly, from a brilliant scarlet to a dark purplish hue, according to the nature and cause of the inflammatory process. The most hyperæmic portions are not infrequently indicated by a spray of bright crimson lines running parallel with the long axis of the tube. The hyperæmia is most marked upon the posterior wall and in the intervals between the tracheal rings.

The trachea affords an excellent field for the post-mortem study of hyperæmic and catarrhal processes. The vessels of the mucous membrane are occasionally dilated, tortuous, varicose. When the inflammation has reached an intense grade, and especially in the tracheitis which complicates acute infectious processes, or which occurs as the expression of phosphorus and other forms of poisoning, small hæmorrhages into the submucous tissues are not infrequently met with.

Swelling is generally inconsiderable, and is most marked upon the posterior wall and between the cartilaginous rings. The trachea is peculiarly exempt from oedematous and suppurative processes, from the compact nature of the submucous tissues and the tenacity with which the mucous membrane clings to the walls of the tube.

In a large number of cases examined post-mortem I have never met with ulceration in the simple form of tracheal inflammation.

The most striking microscopical appearances are marked dilatation of the superficial blood-vessels and a swollen condition of the glands and their ducts. The submucous tissues are more or less infiltrated with round cells, and here and there the epithelium is wanting or degenerate.

Symptoms and Diagnosis.—There are no characteristic symptoms of tracheal inflammation, and the diagnosis can therefore only be made with certainty with the laryngoscope.

Complications.—Small cystic formations, tracheal diver-

ticula, and papillomatous excrescences are not infrequently met with as the result of chronic tracheitis. The latter are especially prone to follow chronic irritation of the trachea in the negro race. Occasionally hyperplasia of the muscular layers can be detected, and, in rare instances, a degree of thickening sufficient to diminish considerably the lumen of the tube. Amyloid degeneration of the tracheal walls has been detected by Balser,¹⁰⁵ and Petit¹⁰⁶ reports a case of asthma cured by excision of an eroded tracheal ring.

Prognosis and Treatment.—The prognosis will depend upon the cause of the tracheal inflammation, and the treatment must be carried out in accordance with the principles indicated in the section devoted to Laryngitis. Local medication of the tracheal membrane is best attained by inhalation of the medicament either as vapor or as a finely divided spray. *John Noland Mackenzie.*

- ¹ Sat. i., v. 33 et seq.
- ² Ibid., iii., v. 99. See also v. 113.
- ³ Sexti Pompeii Festi, de verborum significatione, vol. i., p. 77. Lond. ed., 1826.
- ⁴ Epod., xii., 5.
- ⁵ Epist. ad Attic.
- ⁶ Epod., i., 106-108.
- ⁷ Principles and Practice of Medicine, p. 263. Philadelphia, 1873.
- ⁸ Trans. of the Med.-Chir. Fac. of Maryland, 1883.
- ⁹ Gazette médicale, 1855.
- ¹⁰ Pathologische Anatomie des Larynx und der Trachea, S. 33. Berlin, 1880.
- ¹¹ Quoted by Sestier. Traité de l'Angine laryngée oedémateuse, p. 137. Paris, 1852.
- ¹² Chronic Diseases of the Larynx, trans. by Beard, p. 117. New York, 1868.
- ¹³ Bogros: Quoted by Sestier, op. cit., pp. 63 and 114.
- ¹⁴ Zeitschrift für rat. Medicin, N. F., Bd. iii. (Ziemssen's Cyclop., Am. ed., 1876, vol. iv., p. 152).
- ¹⁵ Berliner klinische Wochenschrift, No. 2, 1874, S. 16.
- ¹⁶ De Catarrhis. Witteburgue, 1661-62.
- ¹⁷ De deliramentis catarrhi, and the English Trans. Lond., 1650.
- ¹⁸ Hieronymi Cardani Operum, tom. vi., lib. iv., cap. 17, and tom. ix., lib. iii., cap. 3. Lugduni, 1663.
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LARYNX, CONGENITAL MALFORMATIONS OF THE. Congenital malformations of the larynx may be classed under four heads, namely: 1, Absence; 2, excessive development; 3, cleft; and 4, deviations of form and situation.

Complete absence of the larynx occurs in the rare cases of monsters in which the head and the thorax are wanting, and which are known as acephals, amorphi, and acardiaci. A complete absence of the larynx has also been noted in a monster described as "inclusio foetalis peritonei."

Partial absence may consist either in a general atrophy of the organ, or in the absence of one or more of the cartilages. Thus, in some instances there is a complete absence of the epiglottis; in others it is represented by a high rudimentary ridge; while in one case it is described as merely a fold of the mucous membrane. The thyroid, cricoid, and arytenoid cartilages may be absent. They also may be rudimentarily developed, either altogether as regards one of them, or only in certain parts of each. For instance, the thyroid may lack one or both superior cornua. Again, the thyroid may be cleft, and the two plates may be connected together by a cartilaginous band. The same abnormality has been observed in the cricoid, in some instances to such an extent that the connecting band may take the place of the original cricoid, and thus cause it to resemble a tracheal cartilage. Finally, the whole larynx may be abnormally small, as seen in the male when there is congenital atrophy of the testicle, or when castration has been practised early in life. In such cases it resembles the larynx of the female or of a child.

HYPERTROPHY.—This division may be made to include the double formation of the larynx observed in the case of double monsters, namely, in the so-called thoracodidymis, and also in the dihypogastricis. These possess two larynges, but only one pharynx and one œsophagus. A cartilaginous plate is sometimes found interposed anteriorly between the wings of the thyroid.

Supernumerary cartilages are occasionally found on the outer corner of the cricoid cartilage. They are analogous to sesamoid bones. Supernumerary folds of the mucous membrane are sometimes seen, as, for instance, a transverse fold below the epiglottis.

The laryngeal ventricle may be abnormally wide and deep, and thus render the part more liable to eversion, to the lodgement of a foreign body, or to other accident. The anterior section of the glottic space may be more or

less occluded by a web-like formation, of considerable density, and somewhat resembling an imperforate hymen.

CLEFT FORMATIONS.—There is no such thing, it is said, as a congenital laryngeal fistula of the neck. A case of cleft epiglottis has been reported by French.

Congenital deviations of form and situation of the larynx are rare, and occur only in connection with congenital malformations of the most marked type, such as hemicephalus, and double spina bifida of the upper portion of the spine, and in extreme lordosis of the cervical vertebrae. In these the whole larynx is depressed and moved backward to the level of the upper dorsal vertebrae. The thyroid is placed very obliquely, by which the inferior diameter of the larynx is markedly increased, while the cricoid is situated much deeper, in proportion to the thyroid, and thereby the true and the false vocal cords are abnormally lengthened. The sinus pyriformis on each side is obliterated.

Slight asymmetry of the larynx, as to position and form, is not infrequently met with. *D. Bryson Delavan.*

Klebs: Handbuch der path. Anat. Berlin, 1880.

LARYNX, ERYSIPELAS OF THE. Erysipelas of the mucous membrane of the pharynx and larynx is, pathologically, similar to the same malady when situated on the skin. It occurs either primarily or by extension from the face along the mucous tracts of the mouth, nose, or ear. Its causes are the same as those which give rise to it when situated upon the external parts of the body, although it has been most often observed in the course of general epidemics of the disease. Of eighteen patients seen by Cornil, in whom the pharynx was affected, fifteen were under the age of thirty, and twelve were females. On inspecting the pharynx, the appearance of the mucous membrane, when affected with erysipelas, differs considerably according to the form of the disease which is present; the local phenomena are generally very different from those of tonsillitis, but sometimes cannot be distinguished from those of simple inflammation of the part.

Cornil makes three divisions of the malady, viz.: (1) Erysipelas with simple redness; (2) erysipelas with phlyctenulae; and (3) erysipelas terminating in gangrene. Erysipelas most commonly reaches the larynx from the pharynx, but the former organ may be primarily affected while the pharynx remains healthy. The disease may extend still farther down the respiratory tract, and become associated with pulmonary congestion and œdema. In cases which come under the first division the diagnosis must remain doubtful, except where the throat lesion is accompanied by manifestations upon the skin.

Erysipelas of the head and neck is often accompanied by more or less congestion of the mucous membrane of the larynx. The symptoms are dysphagia, hoarseness or loss of voice, and pain, increased on pressure from without. Sometimes the disease is much more active, and may result in acute œdema, tending rapidly to a fatal termination. It is believed by some that the so-called primary œdema of the larynx, or phlegmonous laryngitis, corresponds clinically to a localization of erysipelas in the larynx, and that many cases reputed as primary œdema of the larynx are in reality erysipelas. The two affections seem at least to be closely allied.

As to the prognosis, the dictum of Hippocrates—namely, "When erysipelas extends from within outward it is a favorable symptom, but when it removes to the internal surfaces it is a deadly one"—has been confirmed by modern observation. In nine cases analyzed by Cornil, in which the face was first attacked, seven deaths occurred; whereas in nine other instances in which the exanthem preceded the skin eruption, seven recoveries took place. Mackenzie states that he has seen but four cases in the whole course of his practice.

The treatment must be both local and constitutional. The latter should be guided by the general principles which govern the management of the disease in other parts of the body.

As to local treatment, the application of cold to the throat, by allowing cracked ice to dissolve in the mouth, should be practised as long as there is any hope of check-

